

# COMP3211/COMP9211 Computer Architecture

## Lab 1 (Week 2)

### VHDL Modeling and Simulation

#### Goals:

1. Review hardware modeling using VHDL
  - a. Behavioral model
  - b. Structural model
2. Hardware model simulation with ISE and ModelSim

#### Tasks:

Task1: Develop a behavioral model for a full adder.

Task2: Develop a behavioral model for a 32-bit adder.

Task3: Develop a structural model for a 32-bit ripple-carry adder.

Please refer to the online documents

(<http://www.cse.unsw.edu.au/~cs3211/refs/vhdlrefs.html>) on how to using ISE and ModelSim in the lab. Below are the brief instructions:

- Start A VMware session
  - Logon to a machine
  - Type vmware
  - Enter your Unix username and password, and confirm your password when logging on in order to access your Unix home directory.
  - Map your home directory to a local directory E using 'My Computer -> Map Network Drive' and then type "\\cse-reddwarf\loginname".
- Start the ISE project Navigator and create a new project
  - Select the New Project... option (under the File menu) to create a new project in E:\projectname; Select HDL for Top-Level Source Type
  - Choose the default values for the Device and Design Flow
  - Use VHDL Module as the New source
  - Enter the input and output signals of the hardware model
- Complete the VHDL model
  - Go to the project and edit the vhd source code
    - Add the function of the hardware in the behavioral component of the vhd source file
    - Save
- Create the test-bench waveform
  - Select Project → New Source → Test Bench Waveform
  - Set the values for the input signals
  - Save the waveform

- Simulate the hardware model
  - In the Sources panel, Select sources for Behavioral Simulation and select the test-bench waveform file
  - In the process panel, double click Simulate Behavioral Model, which activates the Modelsim.
  - Modelsim generates the simulation results
- Finish a Vmware session
  - Save your work
  - Select “shutdown” from “Start” menu and wait for the window to close automatically
  - Log off.