Milestone 1 — Computer Architecture

Design of a Vending Machine

Hai Cao

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Contents

Abstract

The first milestone in the course involves designing a vending machine using SystemVerilog. Students are expected to adhere to specific coding guidelines and submit reports. If you come across any errors or have suggestions for improving this document, please email the TA: cxhai.sdh221@hcmut.edu.vn with the subject "**[CA203 FEEDBACK]**"

1 Objectives

- Understand coding guidelines.

- Review basic logic design and FSM concepts.

- Design a Vending Machine using SystemVerilog

2 Coding Guidelines

When you're coding, it's important to remember that you'll be revisiting your code multiple times for various purposes like debugging and enhancement. Keeping your code clean will save you a significant amount of time. On the other hand, a messy code file can be visually overwhelming and mentally disruptive, leaving you wondering what you've done.

In this course, it's highly recommended to adhere to the coding guidelines provided in this link.

3 Problem

Vending Machine is a dispenser machine that receives coins or bills and dispenses soft drinks or snacks. A simple vending machine controller is described in Figure 1.
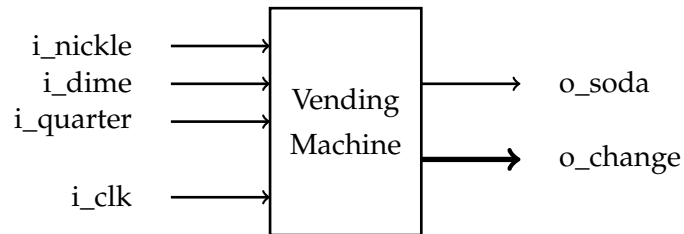

Figure 1: Vending machine's ports

Design a vending machine that meets the following specifications:

1. The vending machine is capable of accepting coins: ¢5 (Nickel), ¢10 (Dime), ¢25 (Quarter). However, it should only accept one coin at a time (per clock cycle).

2. When the deposited amount exceeds ¢20, it should dispense a soda and calculate the correct change.

3. The change is represented as a 3-bit data:

   000 ¢0

   001 ¢5

   010 ¢10

   011 ¢15

   100 ¢20

In this example, the system accepts a dime and then a quarter as input from the customer. In the subsequent cycle, the system dispenses a soda and provides a change of ¢15.
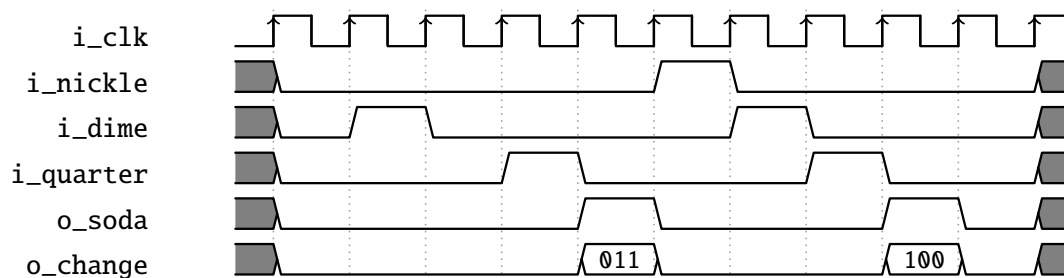

Figure 2: Waveform of an example vending machine