SEG 3300
Assignment #1

Posted: February 1, 2001
Due: February 13, 2001

Question 1: (40 marks)

You are a computer consultant to a firm which wishes to design a card-based system to assist customers in checking in for departing flights at the various airports in the country. The customer inserts the card containing his identification into a slot in the check-in station. The check-in station obtains the customer's name by scanning the card and retrieves the information about any flight which that customer has booked passage on in the next two hours from the current time. The information is displayed to the customer on a touch screen and the customer is asked to **CONFIRM** the flight reservation or to **SELECT** a request for a **CHANGE** to the reservation. If the customer confirms the reservation as is, he or she indicates so and the check-in station inquires as to whether or not the customer has any baggage to check, and if the customer presses **NO**, then the check-in station prints and ejects a boarding pass which the customer can then take to the departure gate. As well, the customer's identification card is ejected and a message is displayed requesting that the customer take their boarding pass and identification card from the machine. If the customer wishes to make a change in the reservation, he or she presses the **CHANGE** button on the screen, the check-in station displays the reservation details and the details for the next available flight to the same destination and asks if the customer wishes to change to the following flight. The customer again has the option of **CONFIRM**ing or **CANCEL**ing the change. In either case, the same procedure as before applies once more. If the customer has baggage to be checked in, then the customer identification card is returned and the message is displayed for the customer to proceed immediately to a check-in agent who will handle the baggage for the customer.

By focusing on the data required (Hint: the check-in station must have access to a reservation file as well as a membership file) draw a data flow diagram which specifies the flow of data between the customer, the check-in system, and the necessary data stores.

Question 2: (40 marks)

Describe the same system using a Finite State Machine representation. Be certain to state and justify any assumptions. (Hint: try to describe the screen/customer interaction)

Question 3: (20 marks)

A fixed-point binary number consists of an optional sign followed by one or more bits, followed by a binary point, followed by one or more bits. Examples of floating-point binary numbers include 11010.1010, -0.000001, and +1101101.0.

More formally, this can be expressed as:

<fixed-point binary> ::= [<sign>]<bitstring><binary point><bitstring>
<sign> ::= + | -

<bitstring> ::= <bit>[<bitstring>]
<binary point> ::= .
<bit> ::= 0 | 1

(The notation […] denotes an optional item, and **a | b** denotes **a** or **b**.) Specify a finite state machine that will take as input a string of characters and determine whether or not that string constitutes a valid fixed-point binary number.