

# EN3240: Embedded Systems Engineering

## Assignment 1 — Modeling & Specification

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**This is an individual assignment!**  
**Due Date: 28 August 2022 by 11.59 PM**

### Instructions

Please read the instructions and questions carefully. Write your answers directly in the space provided. Compile the tex document and submit the resulting PDF. This is an individual assignment. You are not allowed to take or give any help in completing this assignment.

When drawing images, you may draw them by hand, take a photo and add that as a Figure in LaTeX. Please avoid this option unless you have excellent handwriting and drawing capability!

## Problem : Petri Nets (10 Points)

**Draw** a condition/event Petri net model for the following library system. Assume that there are three desks available to users in a library: the reception desk, the collection desk and the return desk. All the books are kept in the warehouse and have a scan code. The process goes as follows. A user goes to the reception desk to borrow a book. If the book is available in the warehouse, it will be fetched and the scan code will be scanned. The user can get the book in the collection desk. When the user finishes reading the book, it will be returned to the return desk. After the scan code is scanned again, the book is accepted and replaced in the warehouse. Note that there is only one scanner in the library. Therefore, it is shared between the collection desk and the return desk. Moreover, assume that there are three employees in the library –one works full-time in the reception desk, the second one works full-time in the warehouse, and the third employee works both in the collection desk and the return desk (s/he cannot be in both desks at a time). In your design, assume the basic condition/event model where a transition is activated when there is one token in each of the input places, and after activation one token is placed in each of the output places (no need to show any number on the arcs). In your design, please show the following four transitions (events): receive book, scan book, return book, and warehouse transfer. Please use the following seven places (tokens) in your design: user 1, user 2, book, scanner, employee 1, employee 2 and employee 3. Please use additional places/tokens/transitions, if needed. Also, the name can be different (if needed), e.g., “employee 1 at reception desk” or “user 2 at return desk”. Place tokens in your Petri net to show the scenario when there are two users in the library –one in the reception desk to borrow a book and the other in the return desk to return a book.

## Solution

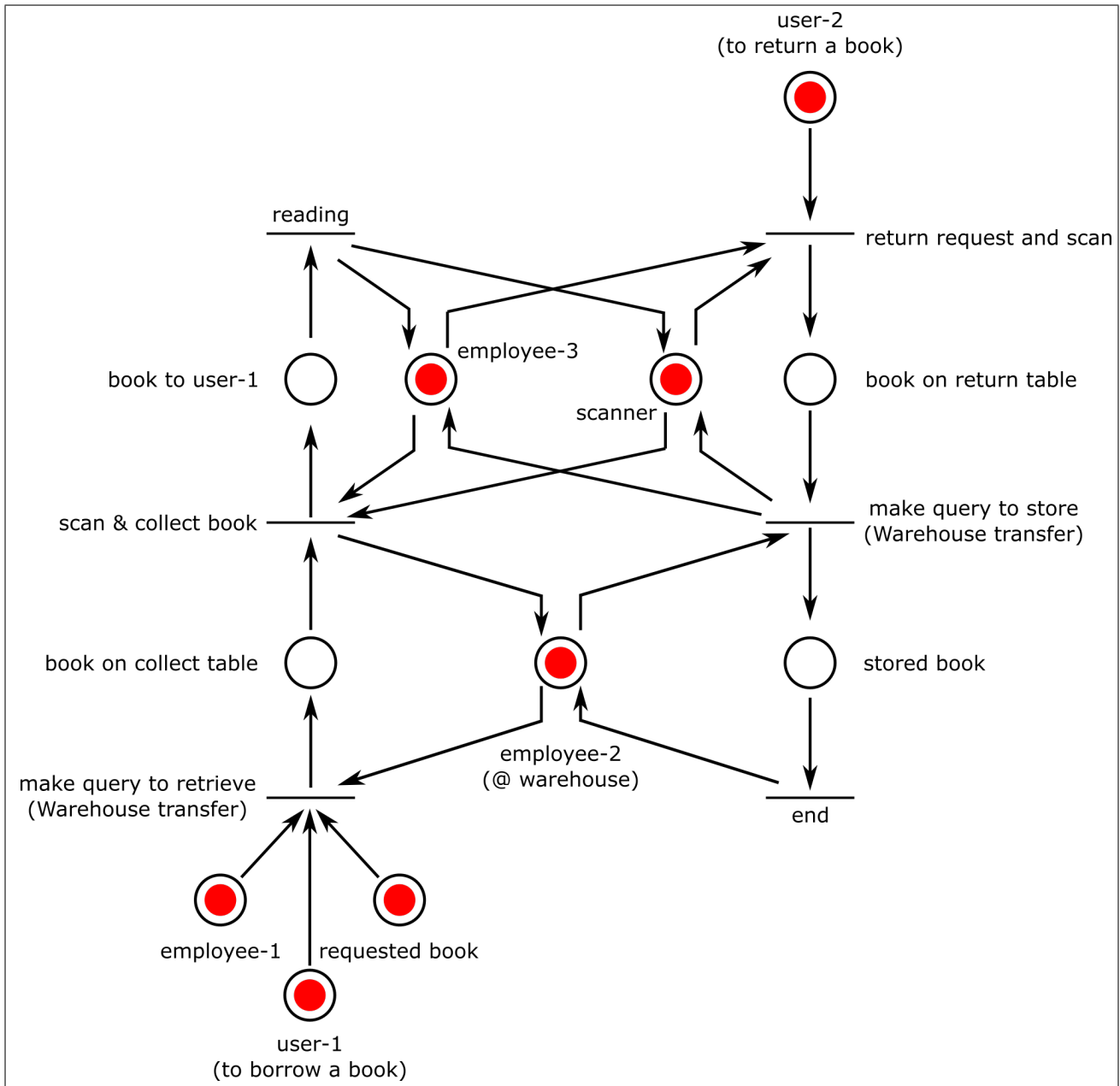


Figure 1: Condition/Event Petri net model for the library system, showing the scenario when there are two users in the library –one in the reception desk to borrow a book and the other in the return desk to return a book