Assignment: Understanding products using Transition Systems

Deadline: 11:59 PM, 31st January 2023

Introduction

The goal of this assignment is to expose you to one of the most important activity a software engineer has to do when they join a product company: understand the software product of the company they can be productive quickly. By leveraging Transition Systems (TS) as a modeling language to capture the dynamics of a system and its subsystems, it is expected that a software engineer can understand the product quickly. We will do the same in this assignment.

You will analyze the behavior of a software product and model the dynamics of the system using the **transition systems (TS).**

[Appointy](https://appointy.com/) (https://appointy.com/) is an appointment scheduling system for small-businesses globally (*It is a startup based out of Bhopal, they have been in this business for a very long time and the product reflects their rich knowledge of the space*). Small-businesses sign-up for a license and get their branded online system for their customers to book appointments and their employees to handle the business.

Your goal is to describe the dynamics of key components of the system (as mentioned below). We call these components subsystems. Model using transition systems by defining the six-tuple (X, X0, U, F, Y, h), using the template provided to capture your thought process and model details. Create one model for each subsystem, and for the overall system and each subsystem.

Setup

Assume you have signed up as a business called qBarb, a barbershop (for your assignment, choose whatever fancy name and description you want for your business!). Setup qBarb with the following configuration.

qBarb is a small business with two employees (E1 and E2) and offer 3 services of 30, 60, and 90 respectively (S1, S2, S3). The business operates 10 am to 5 pm during weekdays and 11 to 8 pm during weekends (Saturday and Sunday). S1 can be done only by E1, S2 can be done only by E2, and S3 can be done by either of them. E1 and E2 work only 10 hours a week, and their availability schedule for the month is setup at the beginning of every month. They are allowed to change the schedule for any given day by giving 2 days notice. Of course, they can resign as well, giving 30 day notice.

Context

Focus on these three subsystems of qBarb:

- Appointment scheduling - Customers schedule appointments from qBarb's website, and can cancel or reschedule.
- Booking management - Receptionist checks in the guest when they arrive, service is delivered against the booking, payment and feedback are collected, if the guest doesn't arrive, it is marked as

no-show, etc.

- Service Provider management - Service Providers, or staff, are required to service the guest when they arrive; staffs scheduling needs to be done, their availability changes have to be managed, etc.

Of course, there is an overall qBarb system too. For convenience, we call these systems **Q (overall system), S (Appointment Scheduling), B (Booking management), and P (Service Provider management)**.

Appointy Help is a good source to understand the product as well as the business domain of appointment-based businesses.

Assignment tasks

Task 1: List user stories for qBarb

Behavior of a system is dependent on the types of user persona and their stories/scenarios that are implemented by the system. There are three personas here (you can identify more): guest, receptionist, and owner(you).

List key scenarios using user story format for each the overall system, and each of the subsystems. Here is an example:

As a **guest**, I want to **be able to select a specific barber for my haircut** so that **I can have consistent hair style.**

List the important ones first, at least 10 for each.

This list will help you ensure you have captured the behaviors in the Transition System model.

Task 2: Describe the systems

Describe each of the systems: Q, S, B, and P. Note that you may need to refer to other systems when describing a system.

For each system, talk about three aspects:

1. **Structure**: What are the different objects and classes in the system?
2. **Function** - What is the intended functionality of the system?
3. **Behavior**: How does the system behave when stimulated?

You can use UML diagrams to express the above aspects but you are free to use any other means of expression - text, flow charts, mathematical notations, etc. You will find that using more types of expressions provide better clarity.

Note: While there is no strict restriction on length of your description, you will be penalized for long, meandering descriptions - be concise and precise.

Task 3: Create Transition System models

Describe the behavior of each system using a transition systems model. Ensure that the behavior as required for the user stories listed in Task 1 are captured in your TS model.

Use the template (one for each system Q, S, B, and P): TS modeling for software systems.

Evaluation Rubric

Overall goal of the assignment is for you to be able to understand a software product just on the basis of the working system given to you (and some user documentation available online), and capture your understanding in a precise manner. Keep this in mind when performing various tasks of the assignment. Specifically, we will evaluate on the following criteria (% in the brackets denote weightage of each task in overall scoring):

- **Task 1 [20%]**
  - How important are the listed user stories?
  - Quality of the user story writing, adherence to the template
- **Task 2 [30%]**
  - How well can a casual visitor to the site understand this system if they read this description?
  - Clarity, precision and brevity of the description
- **Task 3 [50%]**
  - How well does the behavior of your model align with the behavior of the system?
  - How creative have you been in thinking about each aspect of the system model?
  - How well have you articulated each aspect of the system, how well have you followed the guidelines in the template provided (without being pedantic about it)?

Submission

Submit one PDF document that includes the Task 1 and Task 2 responses, with task names as sections in your document. Submit jupyter notebooks (one for each of Q, S, B, P) for Task 3. Zip these documents in team_< team-number >.zip. Not following this naming convention will result in a penalty.