3rd Seminar – Behavioural Modeling

1   Background

We are engineers at the newly founded *Shopping Experience Ltd.* We provide a cloud-based *price matching service* ("who sells this cheaper?") free of charge, where users of our smartphone app may scan product barcodes while browsing the aisles of a shop or supermarket, and our cloud backend retrieves real-time price matching for the same or similar product from other retailers.

We plan to continuously extend our network of retailer partners who accept and promote usage of this app as a *self-checkout* mechanism. Users may indicate via the app which scanned items they want to add to their cart; the app will provide a running total, as well as greatly expedite the checkout and payment phase. The device uses positioning services to identify the store where the purchase is made. For supported retailers, self-checkout is initiated by scanning the QR code of a self-checkout machine; the contents of the virtual cart as well as customer information will be uploaded to the machine, so that customers can proceed with payment.

2   Seminar tasks

- Using a Sequence Diagram, describe the following scenario: the customer scans a product, it gets recognized by the cloud backend and then the new scanned item is added to the virtual cart, finally the customer scans a self-checkout machine, causing the cloud backend to upload the contents of the cart to the self-checkout machine - the latter happens indirectly, via a service endpoint of the retailer.
- Using Activity Diagrams, describe the process and data flow of shopping via the app. Use swimlanes to allocate the various actions to the various functional components responsible for their execution. Use a sub-activity to describe the image processing pipeline.
- Using a State Machine Diagram, describe the lifecycle of a scanned item. Keep in mind that looking up the barcode in the cloud backend may take some time, that some barcodes may be unknown, and that price matching may be unavailable for some items. Allow the customer to decide whether to put a successfully recognized item into their virtual cart, and to change their mind later at any point. For items placed into the cart, the customer shall be able to adjust the quantity (sparing the effort of scanning the barcode multiple times). Do not forget to include the checkout.
- Using a Sequence Diagram, describe a scenario that demonstrates how price matching works. Include at least two counter offers, and specify how the cloud backend acquires them.
- A select few retailers even allow self-checkout by *online payment* made via the app, without resorting to checkout machines. Design the process, the data flow and the allocation to functional units as an Activity.