Assignment 2: Modelling with Promela Channels

# Exercise 2.1: Model a client server network. Transmitted data should not be visible to clients/servers outside that connection.

The model contains two kinds of processes – clients and servers. The clients create a local channel, and sends it to a server using a global request channel. Using a local channel results in a private connection between the server and client. The following snippet shows the local channel being created and sent to the server:

chan replych = [0] of { byte, byte }; //create local channel

request ! replych, \_pid;

The code is attached in clientserver.pml.

# Exercise 2.2: Model a buffered channel by means of rendezvous channels.

The model contains a reader and a writer communicating by means of a buffered channel. The buffered channel is implemented using two rendezvous channels, and two processes handling the buffer. Each pair of process + rendezvous channel handles reading and writing respectively.

The code is attached in buffered.pml.

## Implementation

The process handling input continuously receives data on the input channel, waits for space in the buffer and places data in the buffer. The code is shown below.

bufferIn ? data; //wait for data from writer

fillCount < BUFFERSIZE; //wait for space in buffer

buffer[bufferEnd] = data; //place data in next empty space

The process handling output(reader receiving) waits for data to be available in the buffer (fillCount > 0), and attempts to send it.

fillCount > 0; //wait for data to be buffered

bufferOut ! buffer[bufferStart]; //send oldest data

## Test

The writer sends data in the form of a byte, and increments the data by 1 continuously, so that the sent data is 0,1,2,…,255,0,1. The client asserts that the received data is incremented by 1 for each data item.

## Alternative solution

It is possible to implement a buffered channel using only rendezvous channels and a *single* process handling the buffer. This solution requires extra synchronization, which must be implemented in the reader and writer.