Module: 6SENG005W Formal Methods
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Tutorial Exercises: 1
Subject: PaperRound B Specification & B tools Atelier B & ProB
Date: Week 02

1 B Specification of a PaperRound

This is a (partial) specification of a simple a *paper round manager* system.

MACHINE $PaperRound$

VARIABLES
$houseNumbers$

INVARIANT
$houseNumbers \subseteq \mathbb{N}_1$

INITIALISATION
$houseNumbers := \{\ \}$

OPERATIONS

$addNewHouse(\ newHouse\ ) =$
PRE
$newHouse \in \mathbb{N}_1 \ \wedge \ newHouse \notin houseNumbers$
THEN
$houseNumbers := houseNumbers \cup \{\ newHouse\ \}$
END ;

$numbHouses \leftarrow howManyHouses =$
BEGIN
$ans := card(\ houseNumbers\ )$
END

END

1.1 Explanatory Notes

1. $PaperRound$ is the name of this B specification. It is an example of a *B abstract machine*.

2. It keeps track of houses that receive paper deliveries by recording the house numbers using the state variable $houseNumbers$.

   $houseNumbers$ holds values that are *sets of natural mumbers*, i.e. subsets of $\{ 1, 2, 3, \ldots \}$.

   So a possible value could be: $houseNumbers = \{ 1, 24, 37, 59 \}$.

3. $PaperRound$ has two operations that allow its state to be manipulated.

4. Operation $addNewHouse$ — adds the number of a house that wants to have papers delivered.

   The house number of the new house is *passed* into the operation using the parameter $newHouse$.

5. Operation $howManyHouses$ — is an enquiry operation that returns the number of houses that currently have a paper delivered to them.

   For example, if $houseNumbers = \{ 1, 24, 37, 59 \}$ then $howManyHouses$ will return 4.