6SENG001W Reasoning about Programs

Tutorial 8: Structuring B Specifications - Multiple B Machines

Introduction

These tutorial exercises refer to the notes for **Lecture 8: Structuring B Specifications**.

In this tutorial you are required to use the two B tools **Atelier B** & ProB to animate & extend several multi B machine specifications used in **Lecture 8**.

Exercise 8.1

Review the **Lecture 8: Structuring B Specifications** notes, in particular familiarise yourself with the **structuring clauses**.

Exercise 8.2

Create a new B "Safes" Project using **Atelier B**, then create several new "Components" & then paste the four B machines of the *Safes* Specification used in **Lecture 8** into separate components.

Safes Example:

- Safes.mch

- Keys.mch

- Locks.mch

- Doors.mch

Type check it using **Atelier B**.

Load the **Safes** machine specification into ProB & animate it.

Make sure you understand how the four machines are linked to achieve the complete specification, do this by using ProB's analysis features.

For example, after executing each operation **check** how the state has been modified.

Do this by use ProB's "Eval" terminal to check the values of the state variables of all of the machines.

Also use the "Eval" terminal to test the truth value of the:

- Operations's *preconditions* &

- IF statements's *conditions*.

Investigate the other features of ProB:

- "Open Evaluation View"

- "Analyse Invariants"

- "Analyse Properties"

- "View Current State as Graph"

- "View History as Graph"

Exercise 8.3

Create a new B "Registrar" Project using **Atelier B**, then create several new "Components" & then paste the three B machines of the *Registrar* Specification used in **Lecture 8** into three separate components.

Registrar Example

- Registrar.mch

- Marriage.mch

- Life.mch

Type check it using **Atelier B**.

Load the **Safes** machine specification into ProB & animate it.

Make sure you understand how the three machines are linked to achieve the complete specification, do this by using ProB's analysis features as listed in **Exercise 8.2**.

Exercise 8.4

This involves exploring an example multi-machine B specification that demonstrates the use of various of B's "structuring" mechanisms, & highlights what parts of one B machine can be used in another B machine.

Create a new B "MultiMachine" Project using **Atelier B**, then create **four** new "Components" & then paste the four B machines:

- [M1.mch](M1.mch)

- [M2.mch](M2.mch)

- [M3.mch](M3.mch)

- [M4.mch](M4.mch)

into four separate components.

Type check it using **Atelier B**.

Experiment by loading different machines into ProB & animate it. Which machines allow you to do something?

Make sure you understand how the four machines are linked to achieve the complete specification, do this by using ProB's analysis features as listed in **Exercise 8.2**.

Work on Coursework Specification

When you have familiarise yourself with how the above multi-machine B specifications work use the rest of the tutorial to work on your **Specification Coursework**.

If you are not sure about any part of it ask a tutor.

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