

# alternation

/Reference manual/Z-related commands/Refinement commands

This command is part of the experimental [refinement editor](#).

The *alternation* command refines a specification statement to a non-deterministic alternation statement. It applies the following inference rule of the refinement calculus.

$$\frac{\begin{array}{l} \vdash? P \wedge I \Rightarrow (G_1 \vee \dots \vee G_n) \wedge I \\ \vdash? \Delta F[G_1 \wedge P, I, Q] \\ \dots \\ \vdash? \Delta F[G_n \wedge P, I, Q] \end{array}}{\vdash? \Delta F[P, I, Q]}$$

where  $G_1 \dots G_n$  are guard predicates. The first sub-goal ensures that the guards cover all cases.

The *code* that is implicitly generated by this refinement rule is the following non-deterministic alternation of guarded specification statements.

$$\begin{array}{l} \text{if } G_1 \rightarrow \Delta F[G_1 \wedge P, I, Q] \\ \quad \dots \\ \text{fi } G_n \rightarrow \Delta F[G_n \wedge P, I, Q] \\ \text{fi} \end{array}$$

The *alternation* command is applicable when any specification statement  $\Delta F[P, I, Q]$  in a goal is inspected.

Each guard in the sequence  $G_1 \dots G_n$  is entered into one of a sequence of dialogue boxes using the syntax of a Z predicate. The sequence is ended by giving an empty response. The default response is nothing. Alternatively, if some suitable predicates are displayed in the same window, they can have been selected first (crossed). Additional guards can then be entered in dialogue boxes. The guards are typechecked in the environment of the inspected specification statement. An error in any dialogue box aborts the entire *alternation* command.

There must be at least one guard.

## 1. Tactic example

*“alternation”*  $G_1 \dots G_n$   $p$

This example applies the *alternation* command to specification statement  $p$  using the guards  $G_1 \dots G_n$ .

A tactic that applies the *alternation* command must be executed by *play tactic*; it is not applicable under *apply tactic* as the resulting code would not be accessible to the *code* command.

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