Event-B Theory & Rule-based Prover User Manual

Create Theories

- Create a new Event-B project.
- Left click on the new project, click **new** and then **other.**
- Under category **Event-B,** select **Event-B Theory** and press **Next**.
- Choose the project and a name for the new theory. Make sure it is different from any Event-B files you may have in the project. Ignore categories for the time being. This should look like the following:
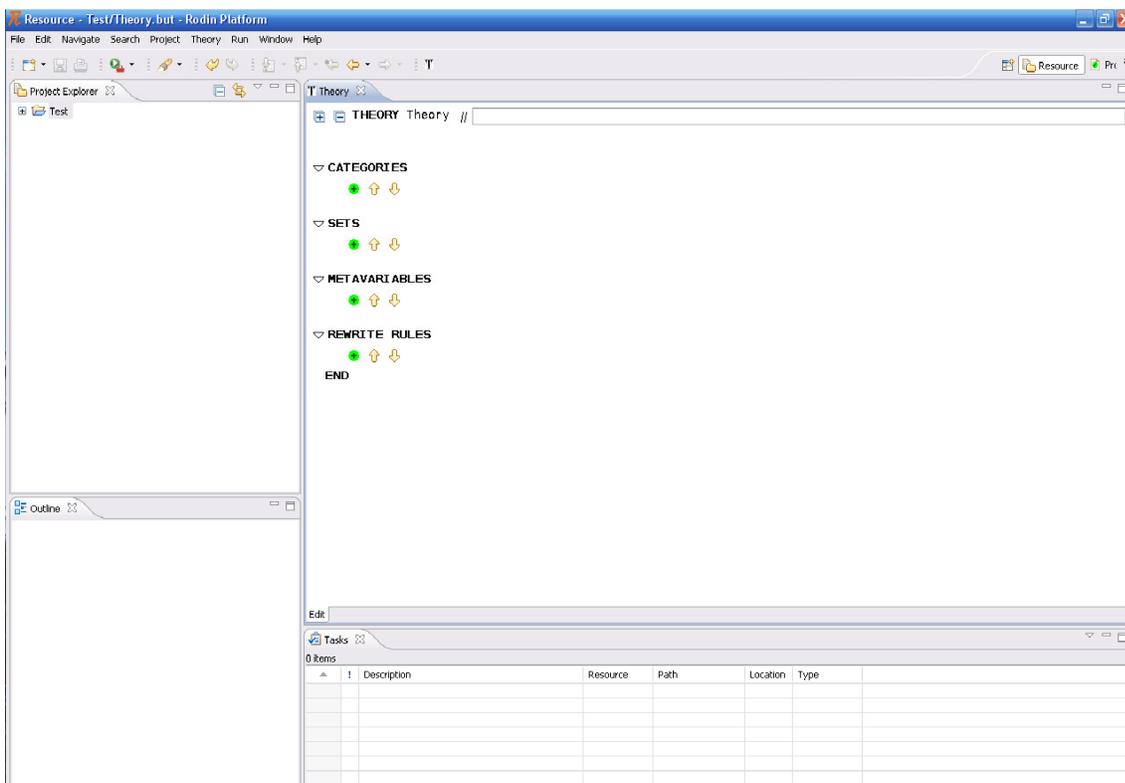
Specify Theories

Theories are specified by defining sets, metavariables and rewrite rules.

Defining metavariables involves specifying a free identifier as well as a type for it. For instance

METAVARIABLES

x : P(ℤ) //

where "x" is the metavariables and "P(Z)" is its type.

Defining rewrite rules involves defining its left hand side as well the right hand sides. For instance

REWRITE RULES

rule1 : lhs x+0 | coverage-complete | non-automatic | interactive | Desc: addition simplification | Tip: simplify addition //

REWRITES

rhs1 : T rhs x //

END

where

- "rule1" is the label for the rule,
- "lhs" precedes the left hand side field,
- "coverage complete/coverage incomplete" toggle button indicates whether the rule covers all possible case,
- "automatic/non-automatic" toggle button specifies whether the rule can be applied by the automatic prover.
- "interactive/non-interactive" toggle button specifies whether the rule can be applied by the interactive prover.
- "Desc" precedes the field where a short description of the rule goes (for proof tree construction).
- "Tip" precedes the field where the tool tip of the rule in case it is interactive.
- "rhs1" is the label for the (only) right hand side of the rule.
- The condition of each right hand side resides right next to its label.
- "rhs" precedes the field where the actual right hand side of the rule goes.

Proof obligations are generated to verify the rules. Selecting a rule to be "coverage-complete" also generates a proof obligation to verify the claim.

Deploy Theories

Once a theory has been developed and validated, it can be deployed using the button ⟨𝕋⟩ . This button is enabled when a theory editor window is selected. Pressing ⟨𝕋⟩ will bring forward the following dialog:
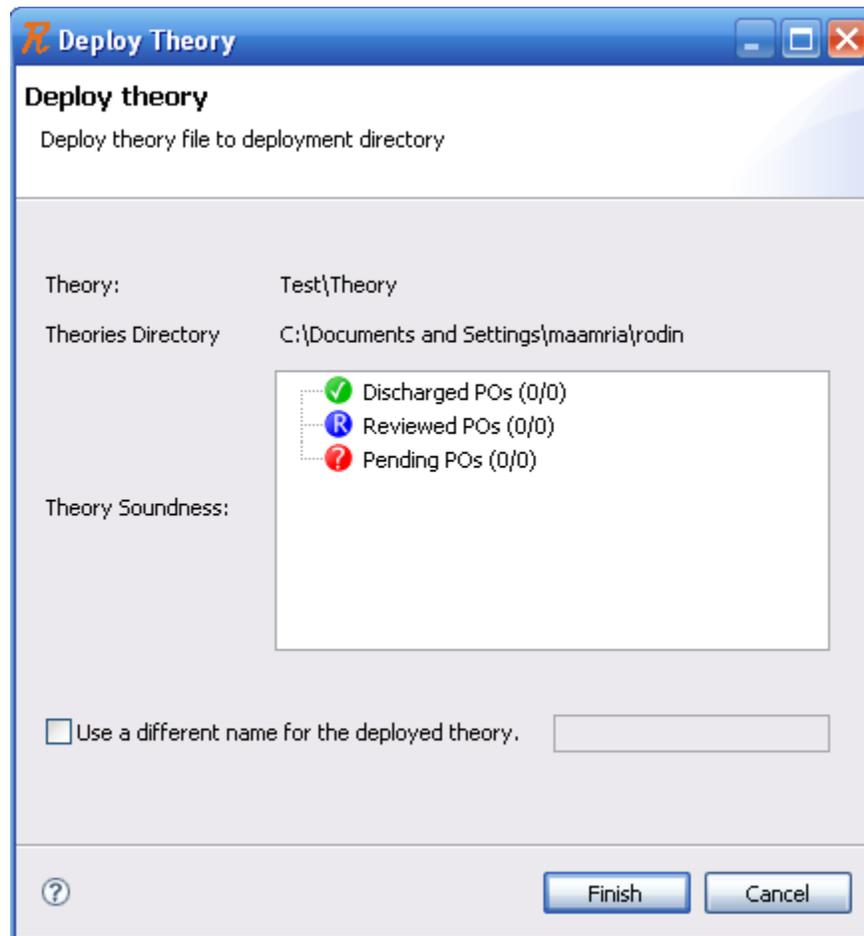
Theories directory can be changed by altering the Theory Setting accessible via the Event-B Preferences.

Use Theories

Once a theory is deployed, its rules can be used with the automatic as well as the interactive prover.

Using rules automatically requires adding an "autotactic" and a "posttactic" to the list of selected tactics. The name of the concerned tactic is "Rule-based Prover Auto Tactic".
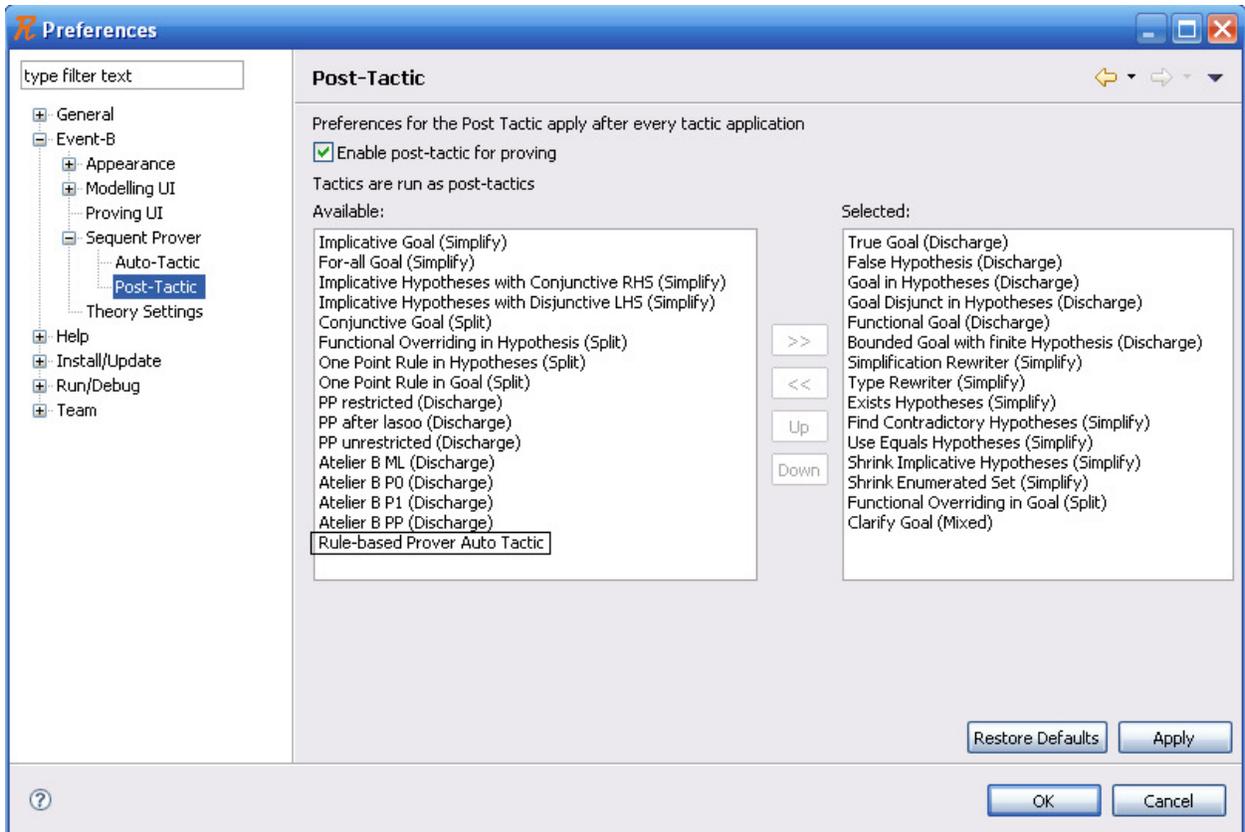
Change Settings

Preferences for the Theory plug-in can be changed through the "Theory Settings" preferences pages accessible via **Event-B** -> **Theory Settings**.

Users can change the directory to which theories will deployed.