HybridSynchAADL

Tutorial

Outline

1. Basic OSATE
2. Creating Property Specification Files (PSPC)
3. HybridSynchAADL Constraints Checker
4. Maude Code Generation
5. Formal Analysis

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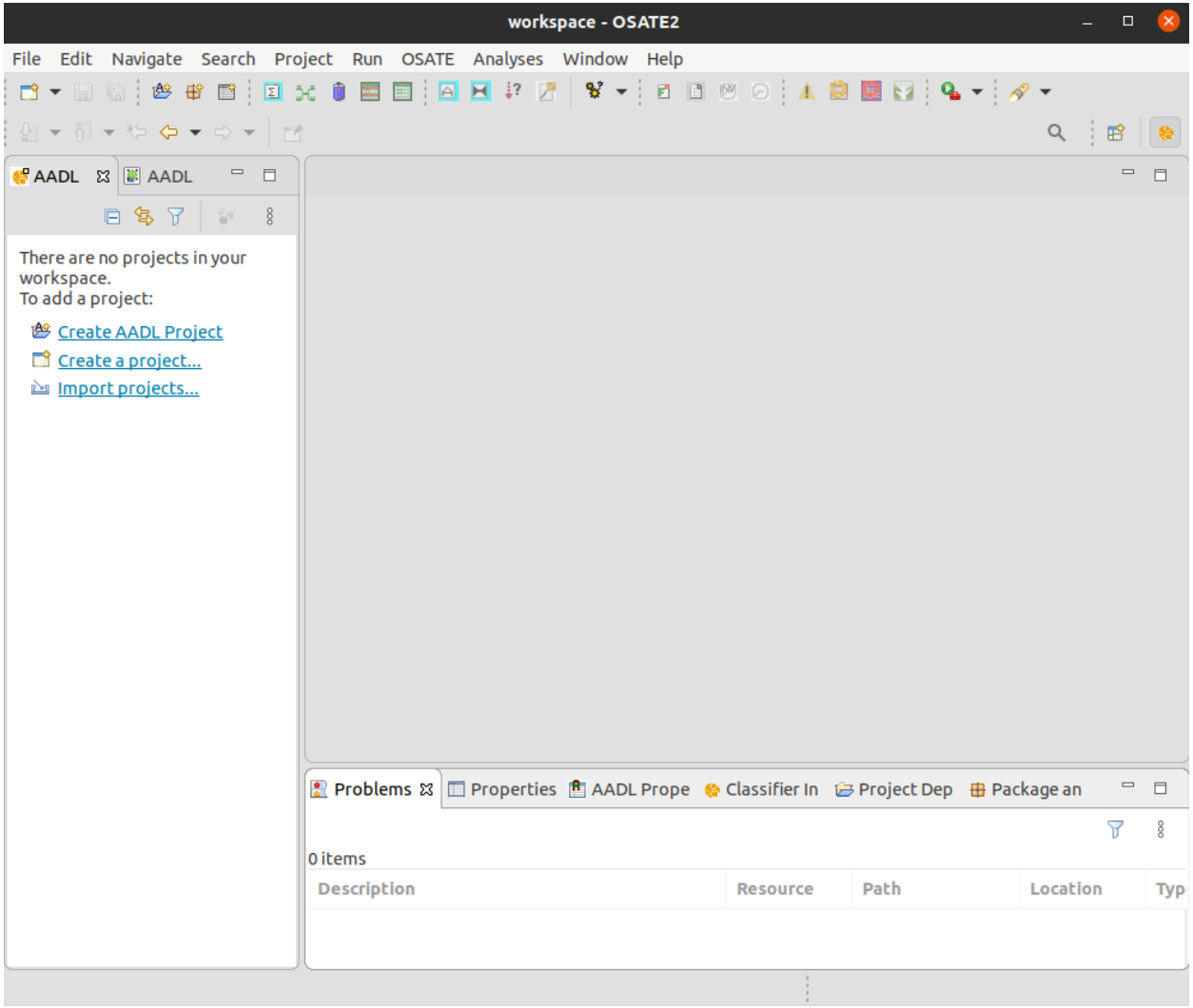
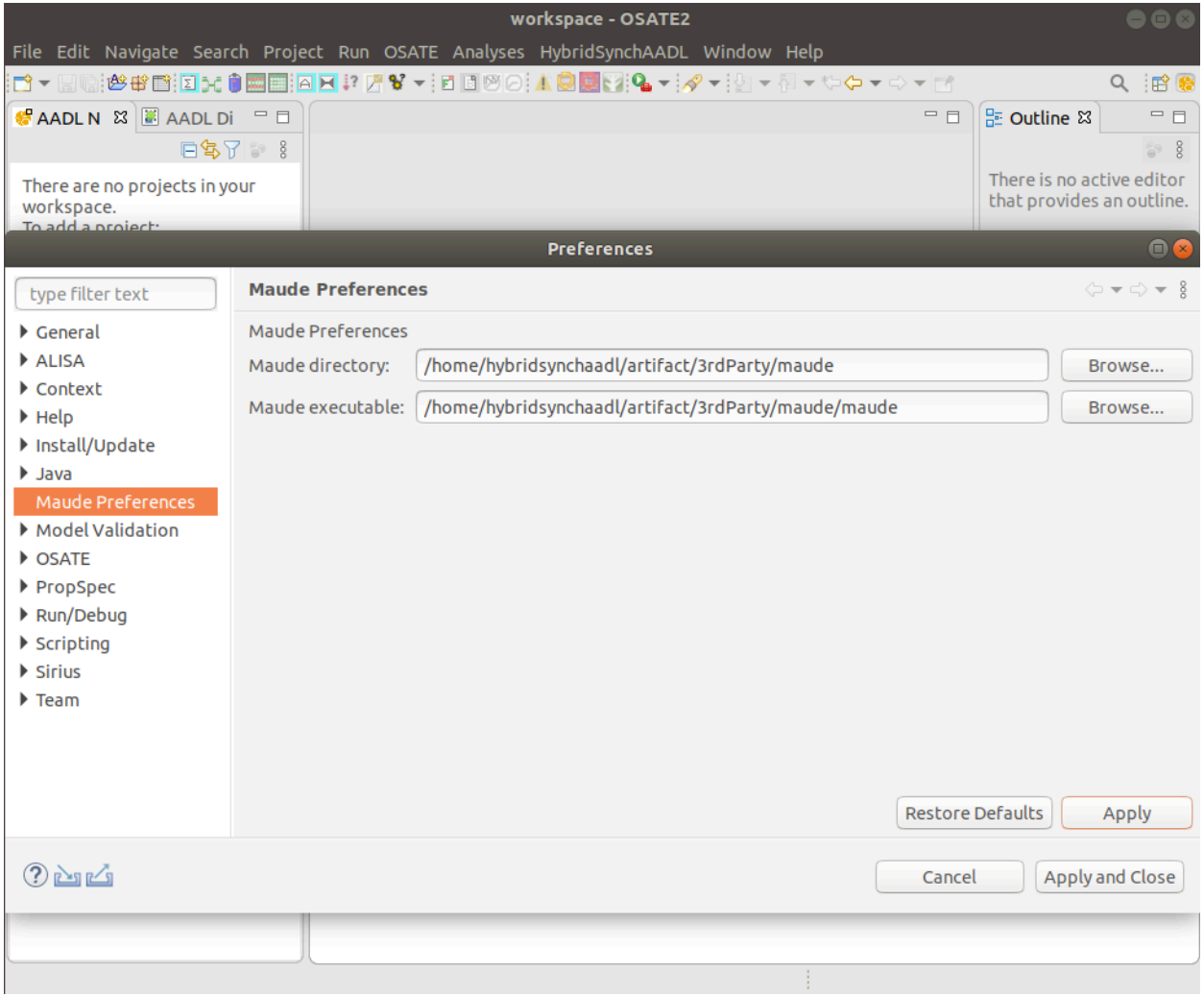
Running OSATE

- You will see this window when you execute OSATE.



Maude Preferences

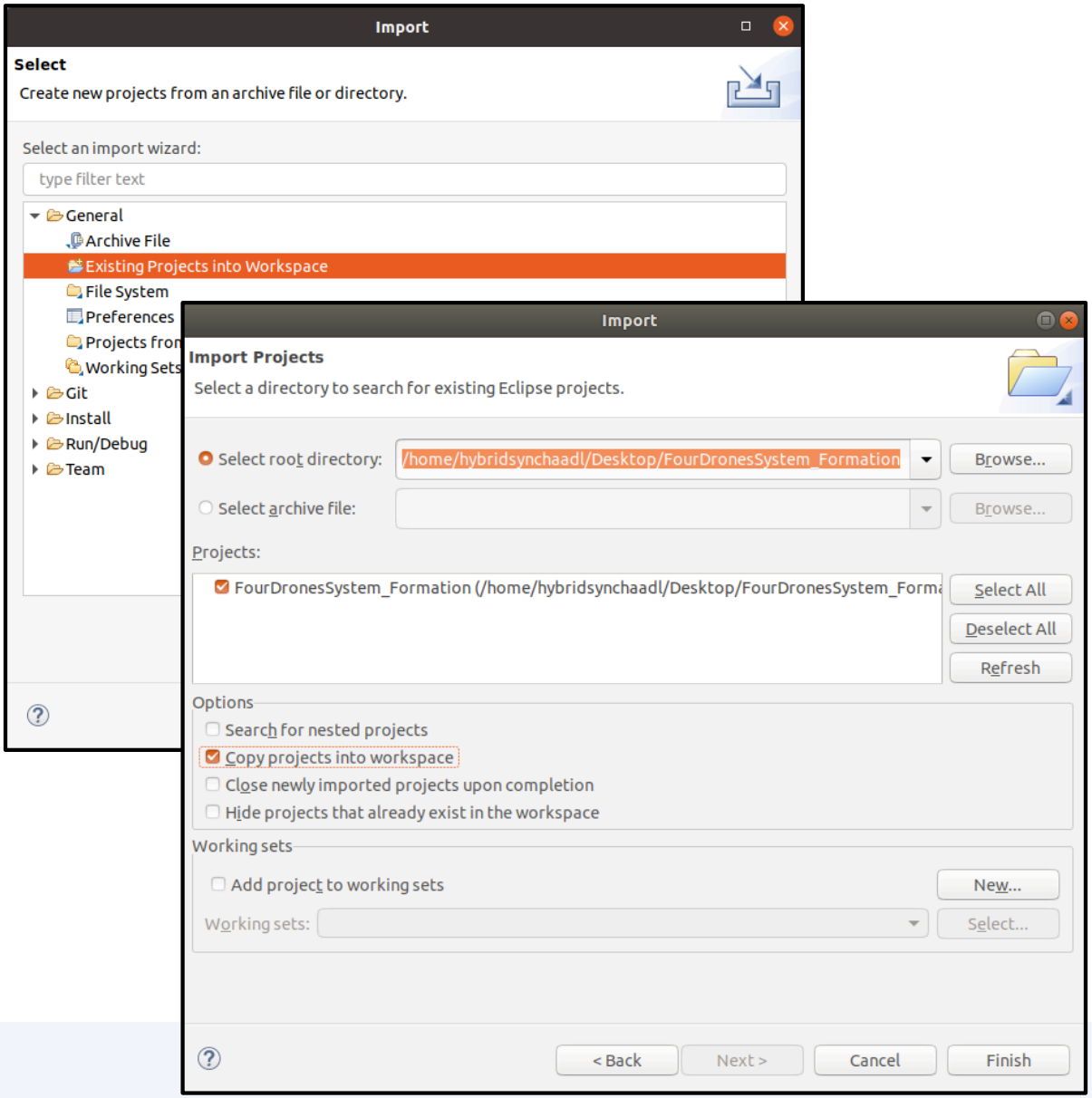
- Before importing an example project, set the proper Maude preferences.
- Open Preferences menu by clicking Menu → Window → Preferences.
- Set Maude directory and executable file location.



OSATE - Importing an Example

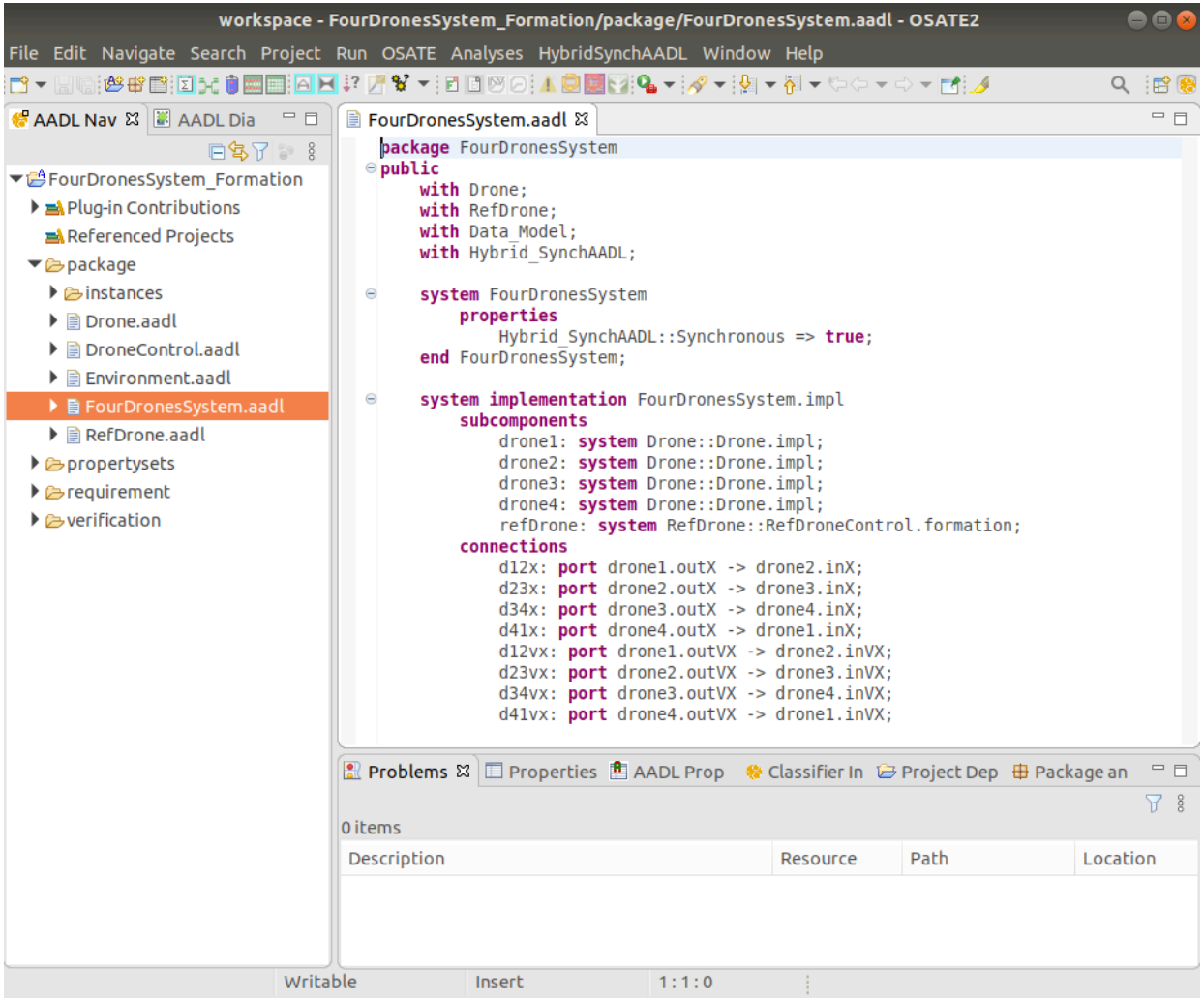
- We start with a simple example, namely, `FourDronesSystem_Formation` in the directory `models/hybridsynchaadl`.

- To import the example, choose
  - Menu → File → Import → General → Existing Projects into Workspace.



FourDronesSystem – Text

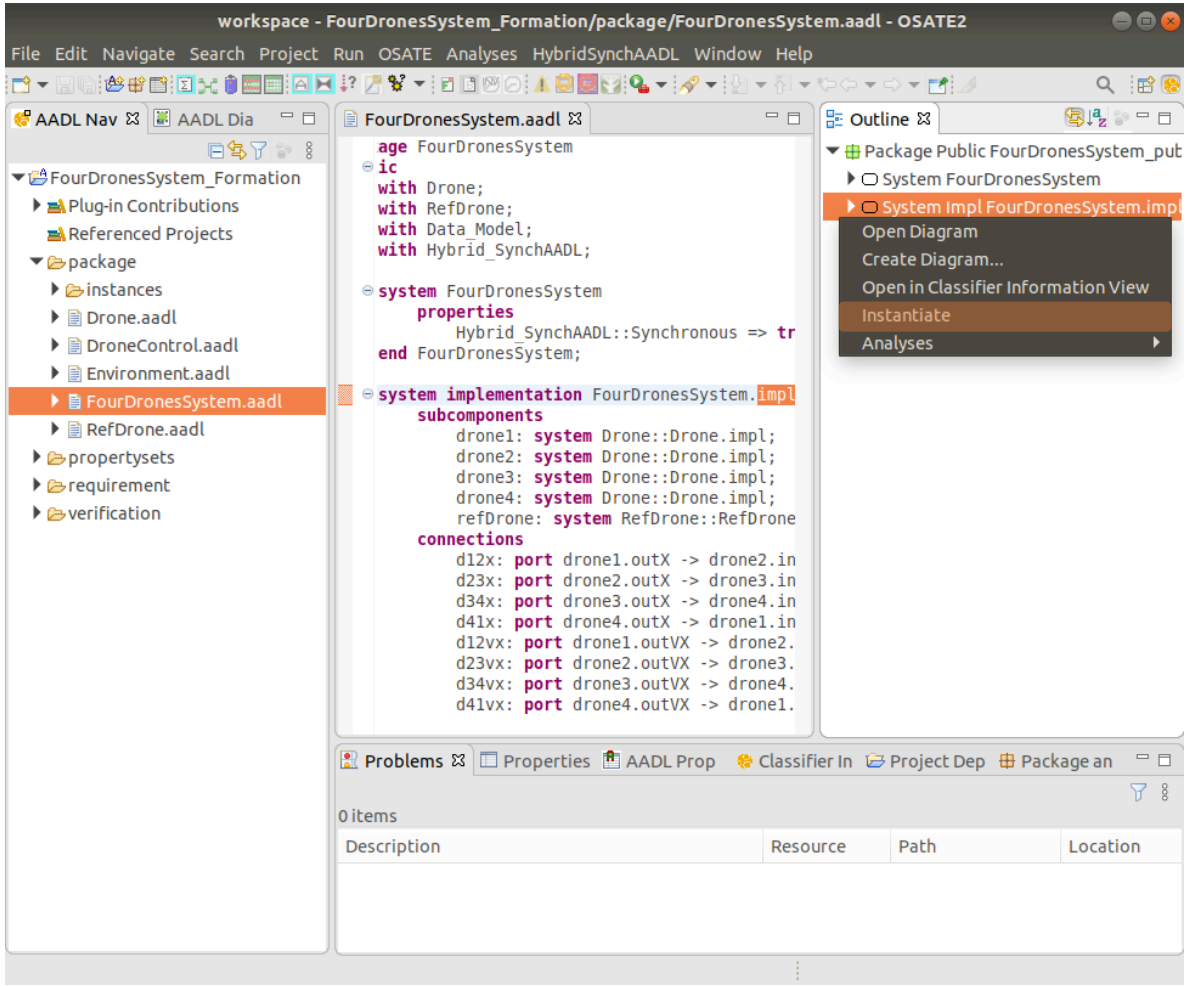
- `FourDroneSystem.aadl` contains the top-level system component.



Instance Model

- Open the Outline view by clicking Menu → Window → Show view → Outline.

- Create an instance model from a system implementation as follows:
  - Right click on `System Impl FourDronesSystem.impl` and choose `Instantiate`.



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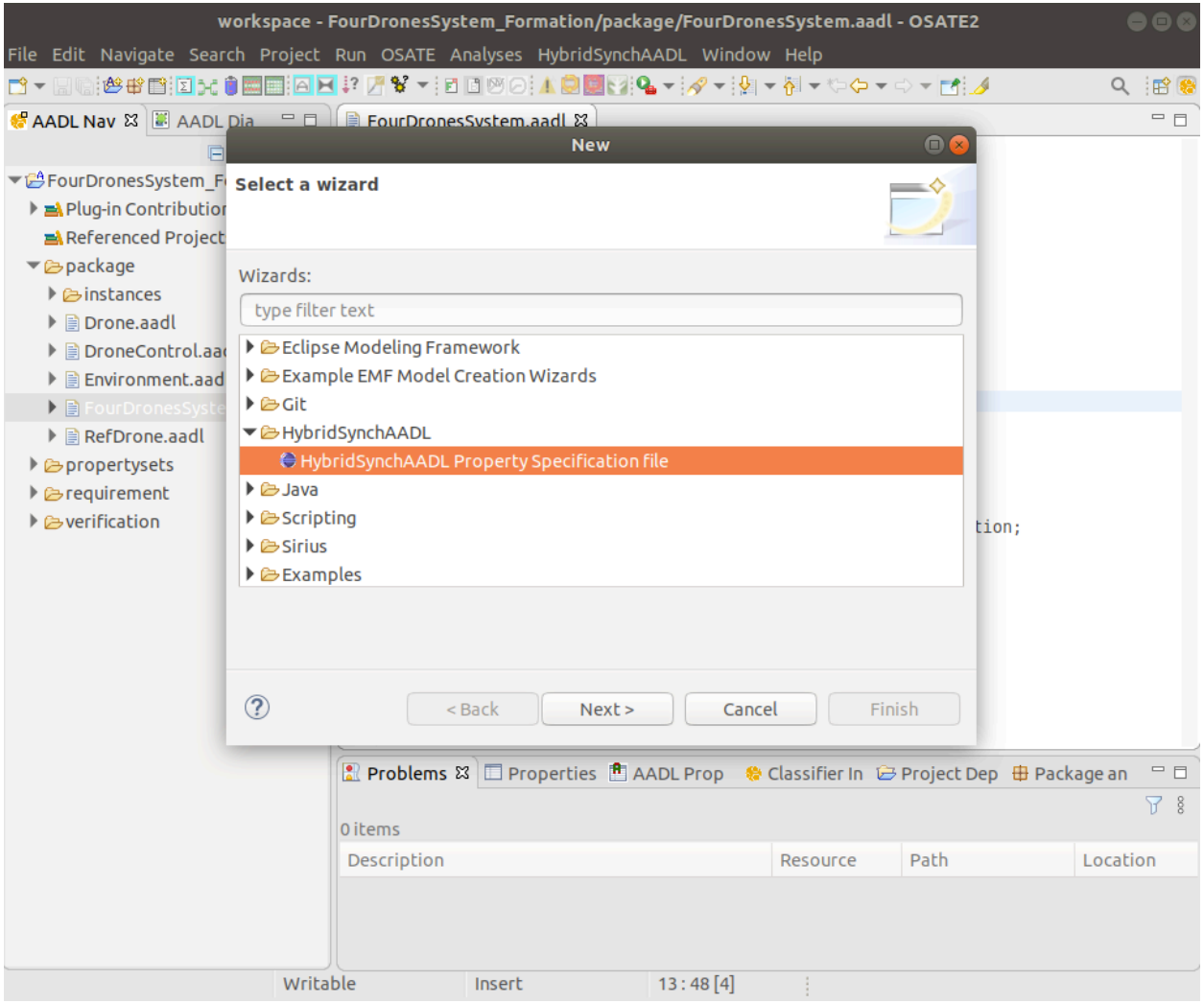
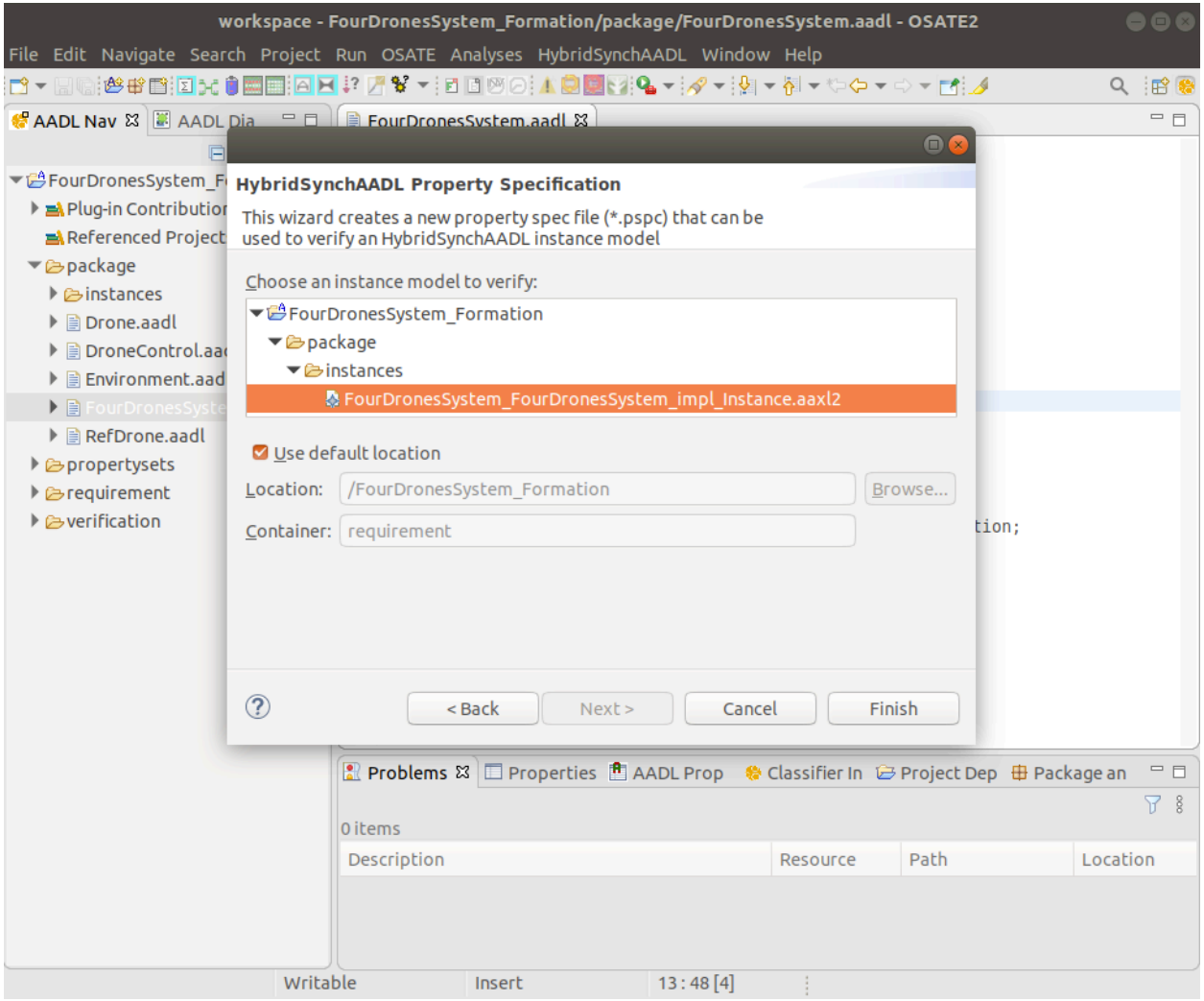
Creating PSPC Files

- To create a PSPC file, choose
  - Menu → File → New → Other → HybridSynchAADL → HybridSynchAADL Property Specification file.



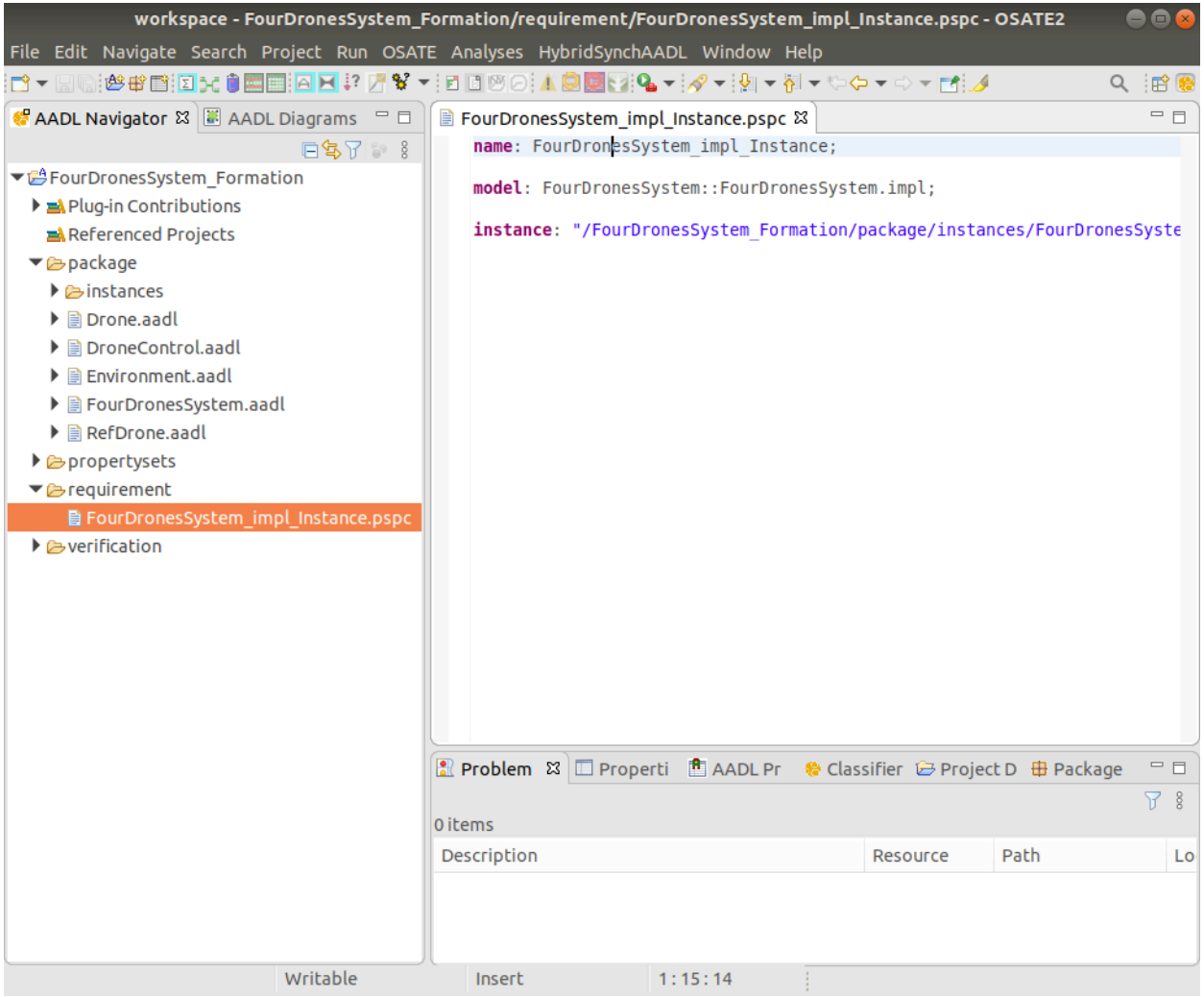
Creating PSPC Files

- Any valid AADL instance model can be chosen in the wizard.
- Choose the instance model we have created in the previous slides.



Creating PSPC Files

- This screen shows the generated (empty) PSPC file.
- There are sample PSPC file in this project



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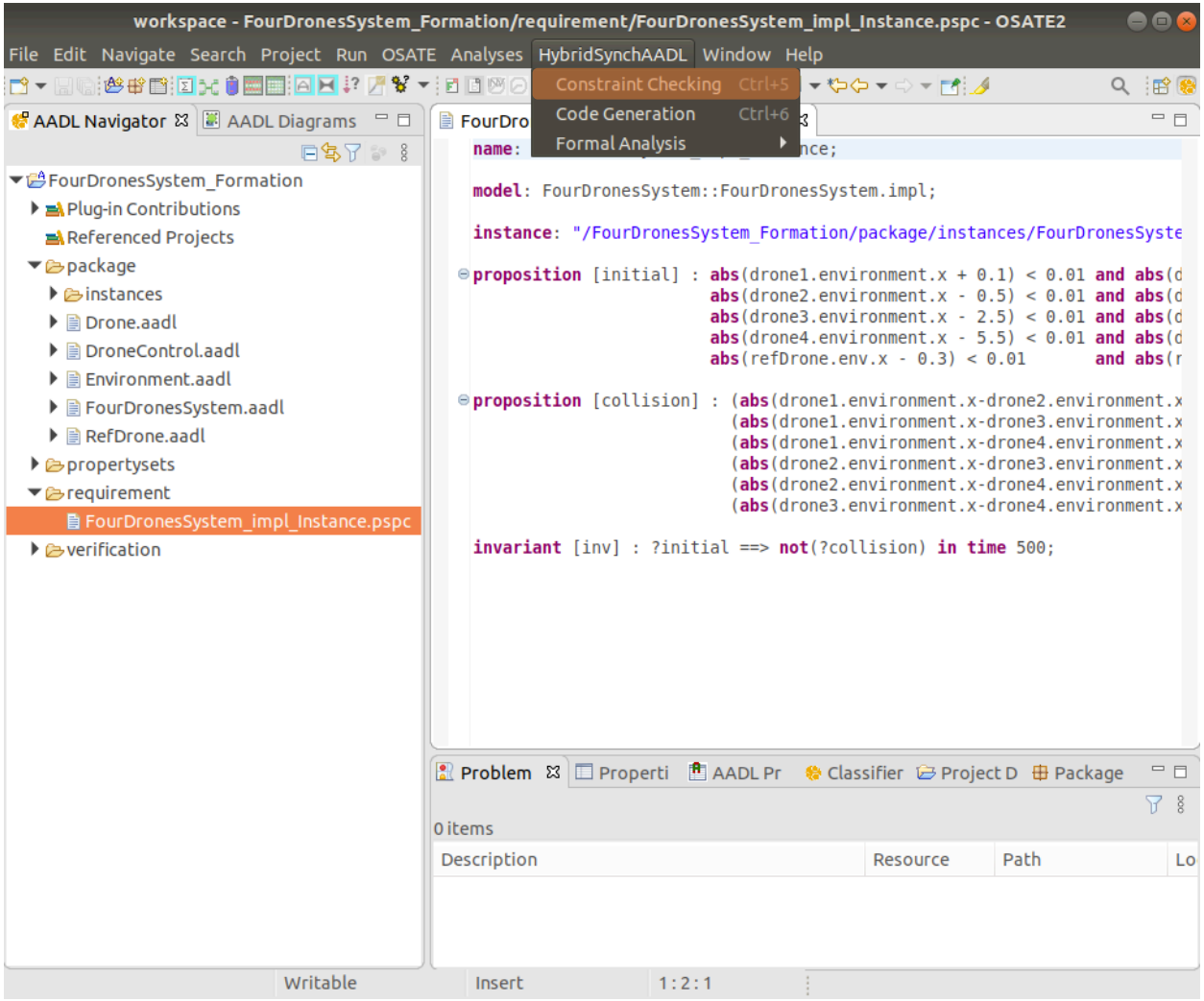
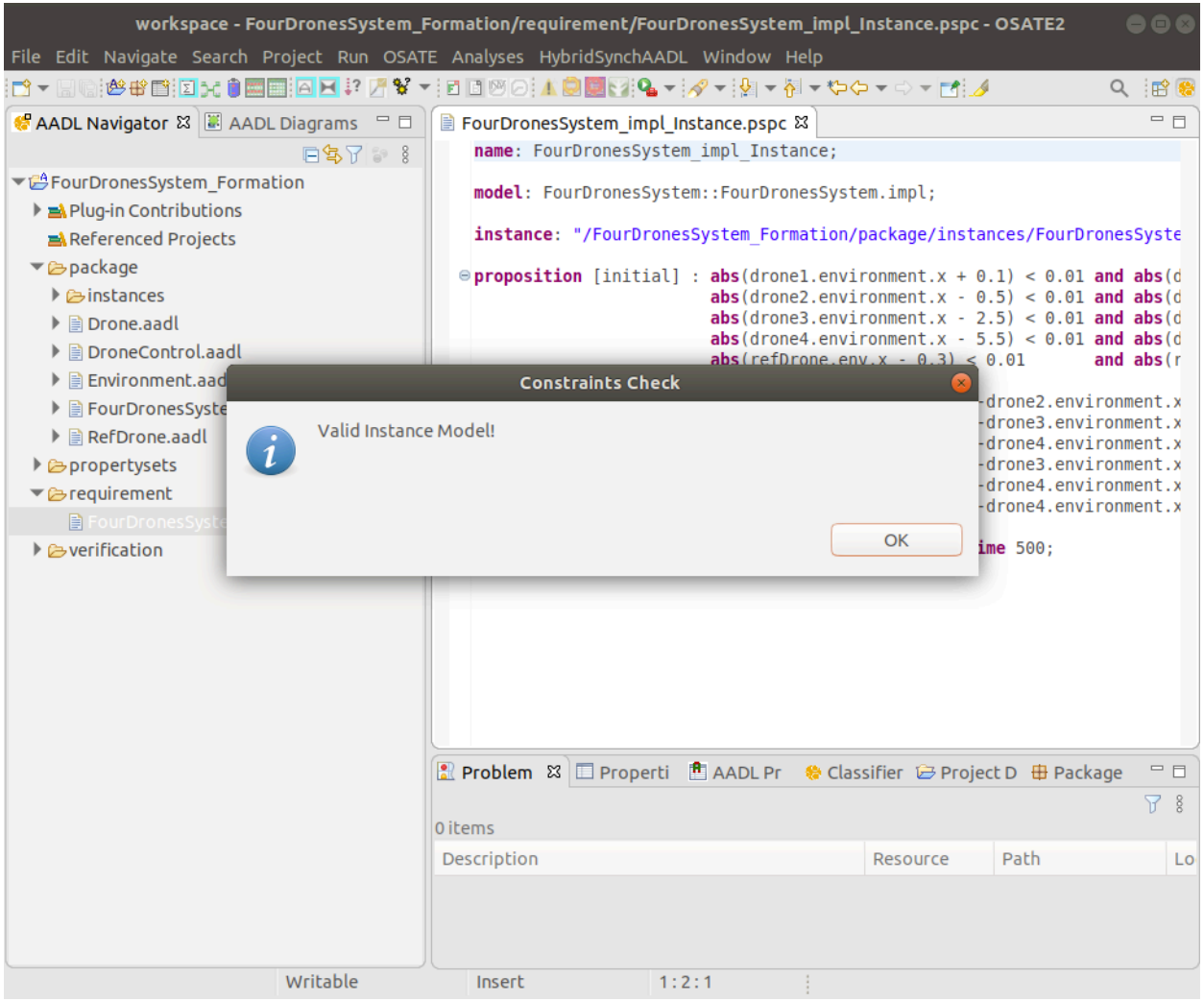
Checking HybridSynchAADL Constraints

- There are three menu items in HybridSynchAADL: `Constraints Check`, `Code Generation`, and `Formal Analysis`.
- Click `Constraints Check` to perform constraints checking.



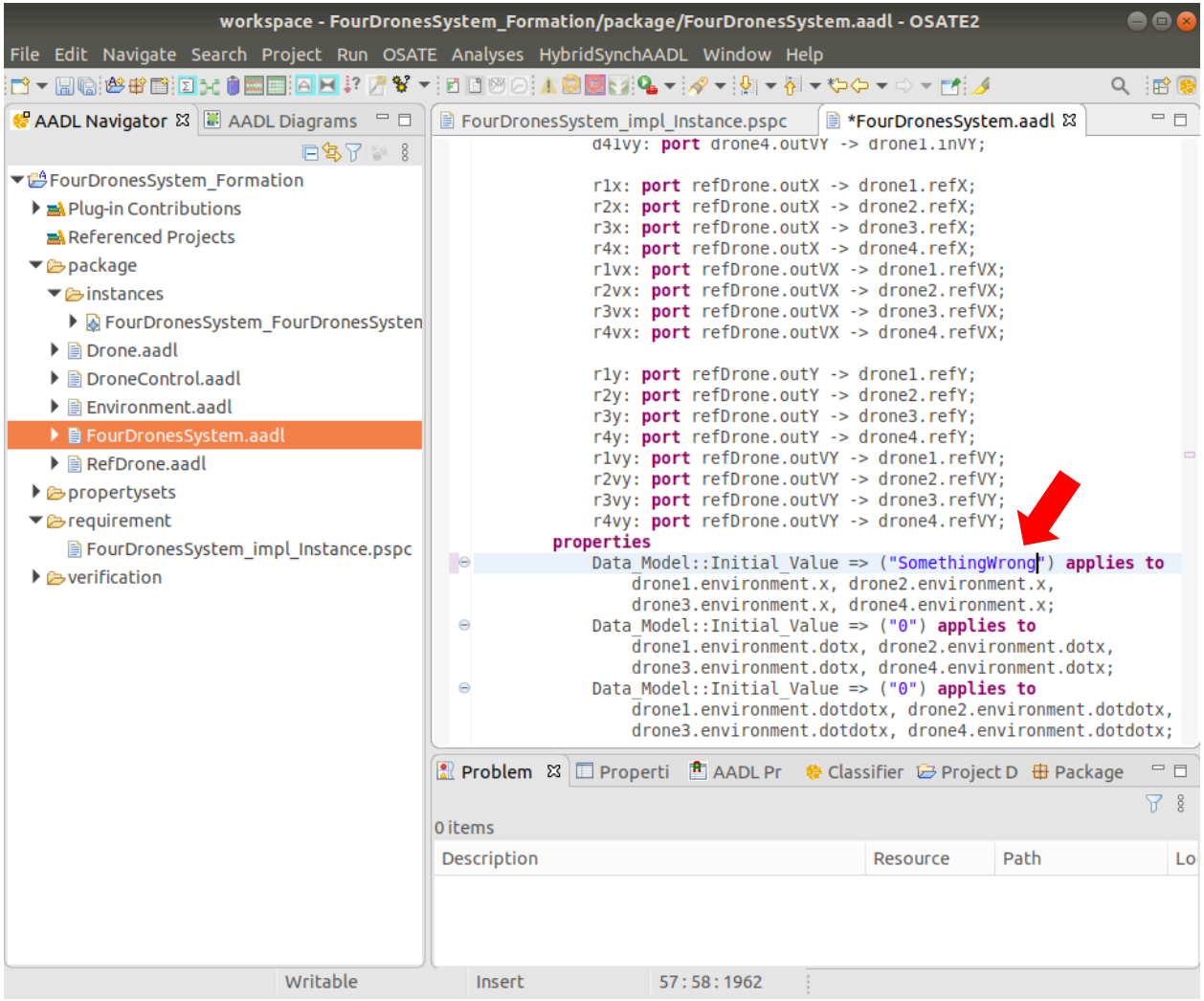
Checking HybridSynchAADL Constraints

- When the model has no constraints error, the tool notifies that the model is valid.



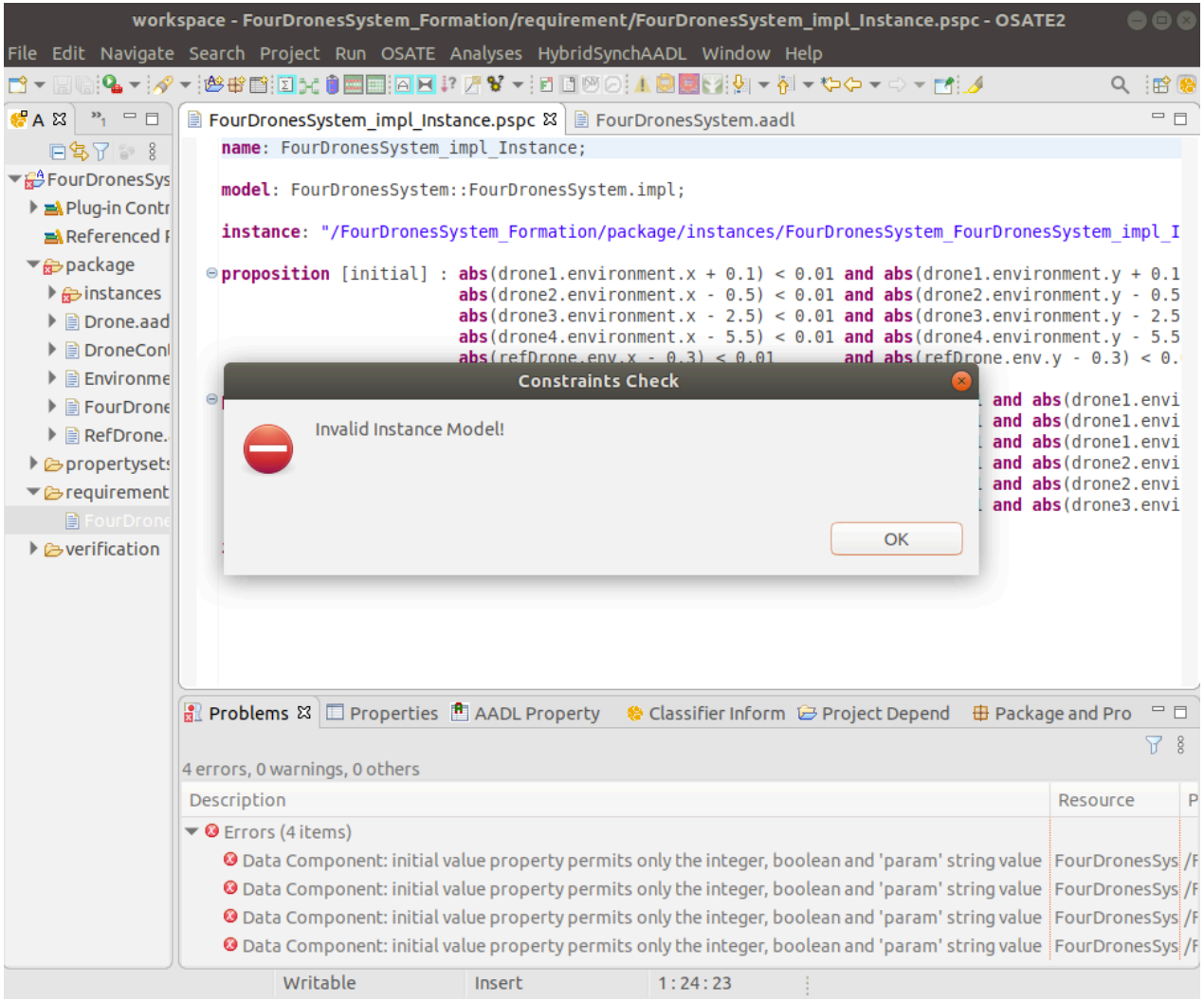
Constraints Check – Erroneous Model

- What if some HybridSynchAADL constraints is not satisfied?
- Let us add an invalid initial value to data component and see what happened.
  - by changing the property value `param => SomethingWrong.`



Constraints Check – Erroneous Model

- After re-instantiating the model, click `Constraints Check` to perform constraints checking.
- Click `Initial Mode`
- Our tool then shows an error message in the Problems view.



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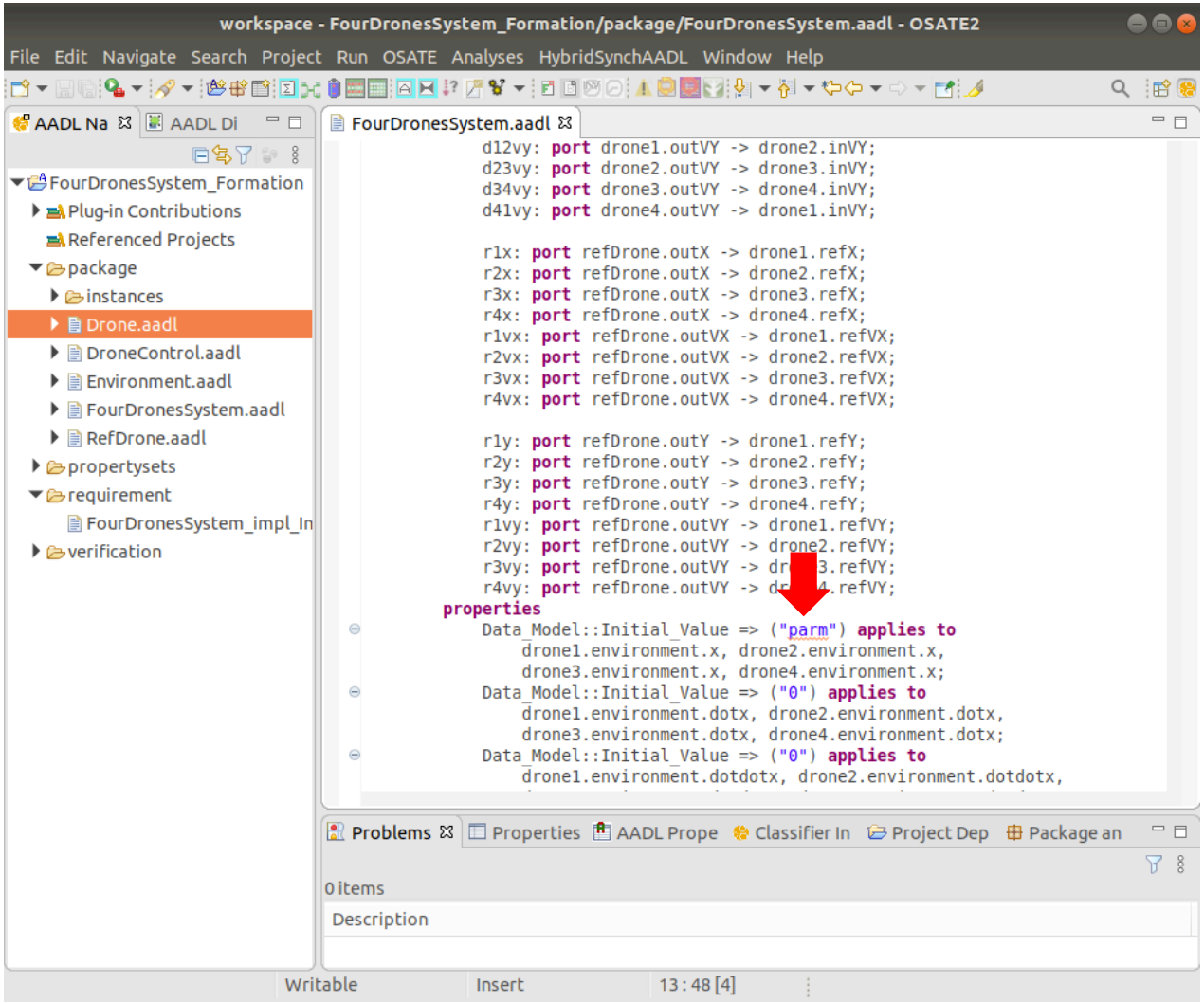
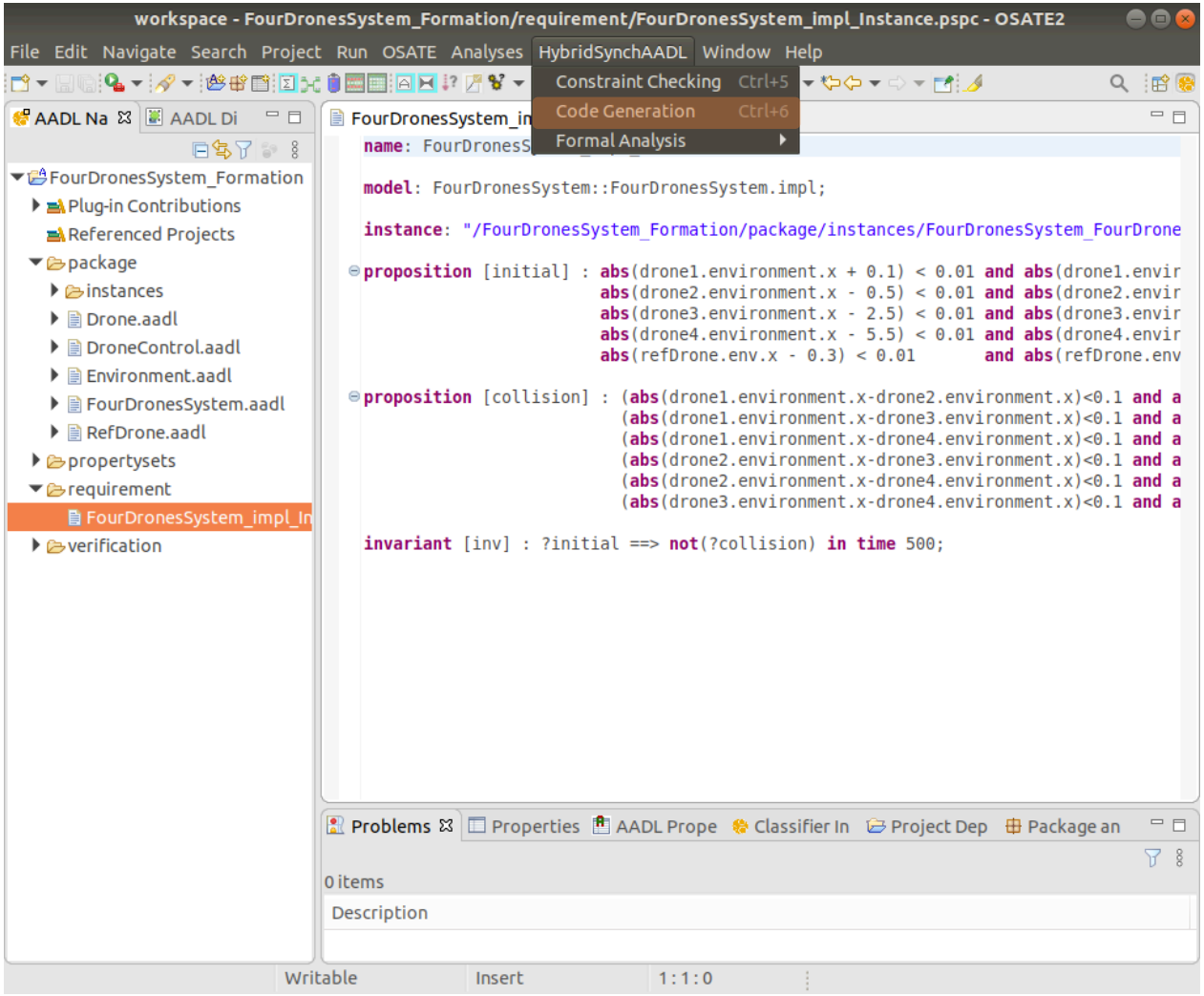
The FourDronesSystem Example

- Let us go back to the correct model.
- Don’t forget to instantiate the model again.



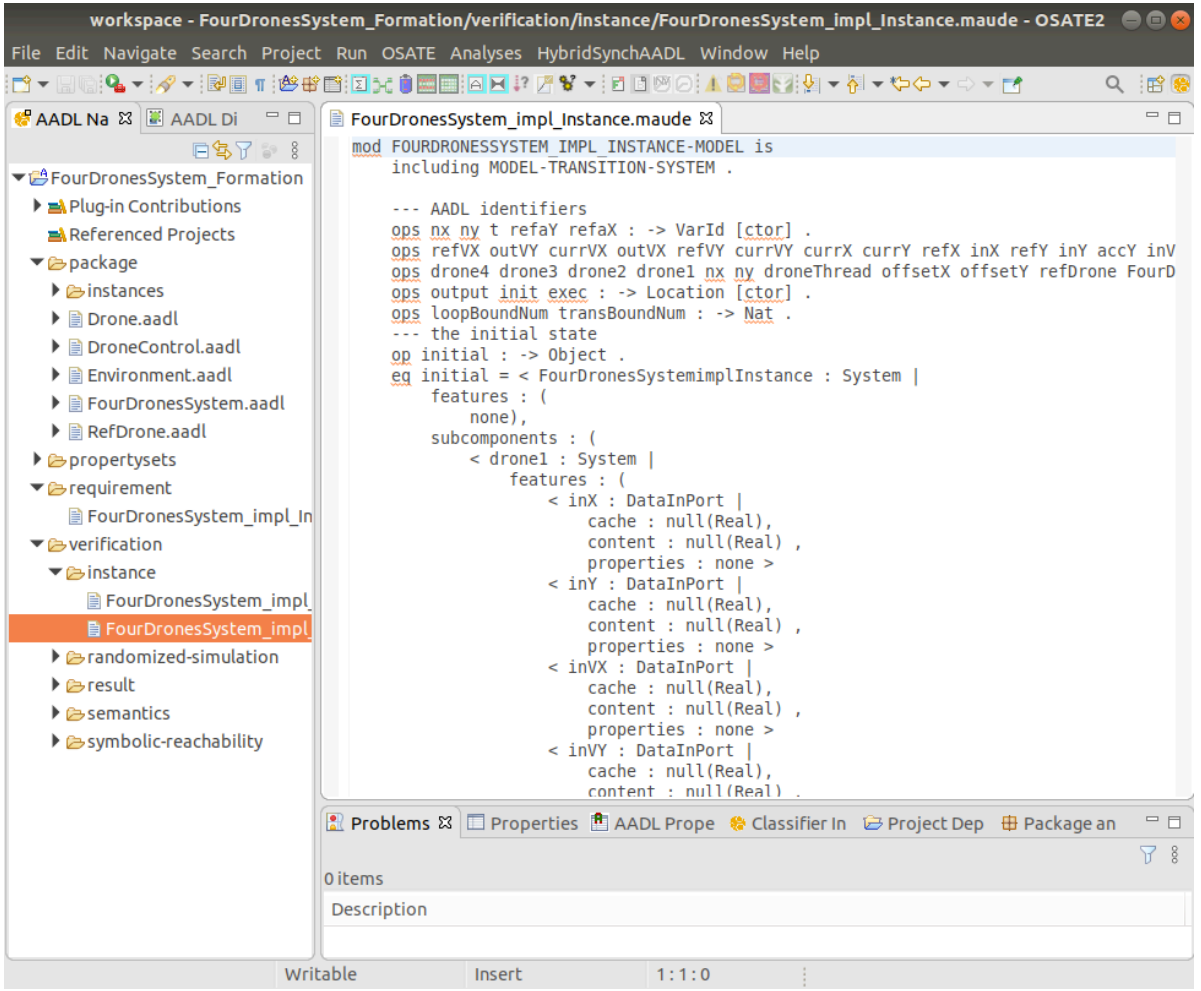
Maude Code Generation

- Click `Code Generation` to automatically generate the rewriting-modulo-SMT model from the HybridSynchAADL model.



Maude Code Generation

- The generated Maude files, including Maude files for properties, are in the `verification/instance` directory.



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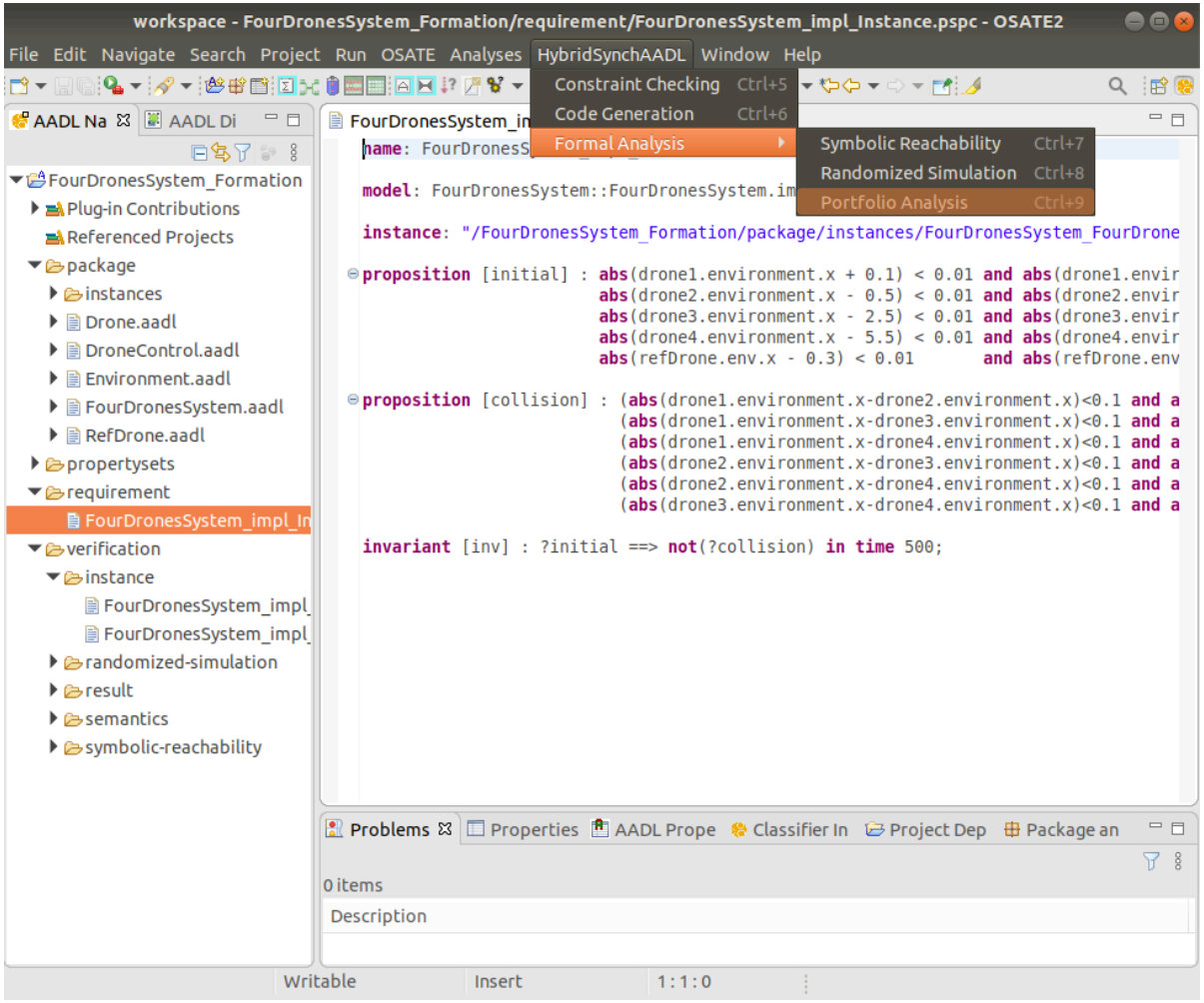
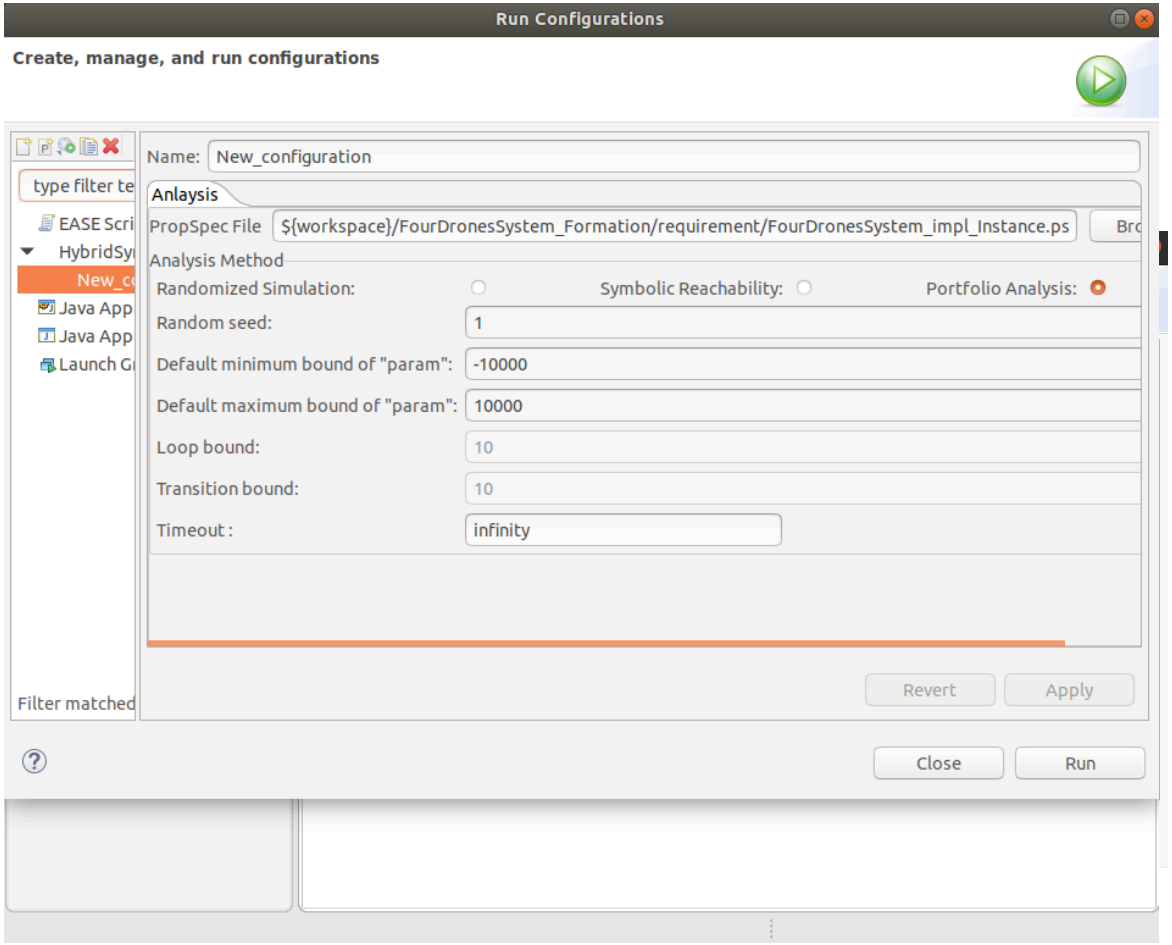
Portfolio Analysis

- Click `Portfolio Analysis` to perform symbolic reachability and randomized simulation simultaneously using rewriting-modulo-SMT.



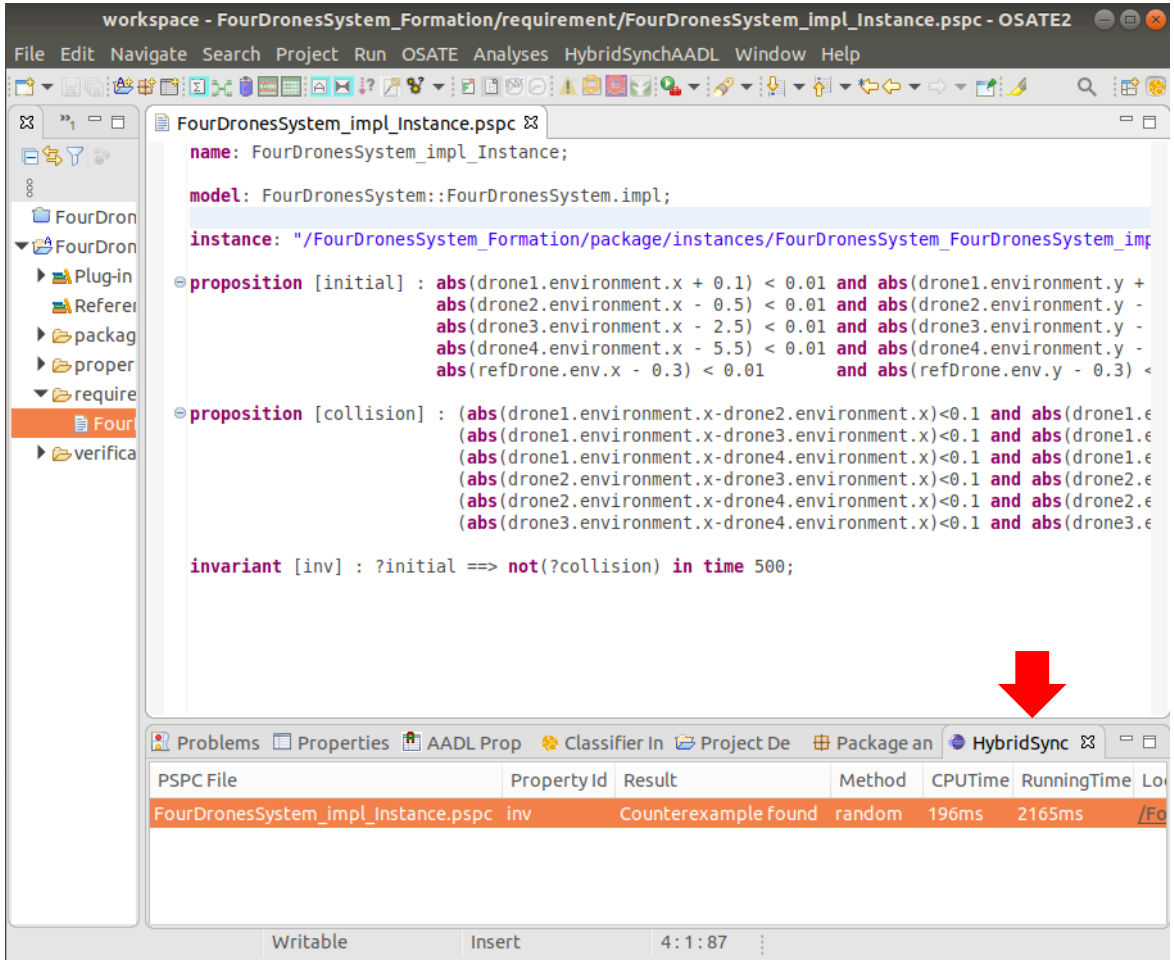
Portfolio Analysis

- Create a new configuration file
- Set PSPC file "FourDronesSystem_impl_Instance1.pspc" path
- Click `Portfolio Analysis` radio button
- Set positive integer value in `Timeout`
  - `infinity` can be set for infinite time.



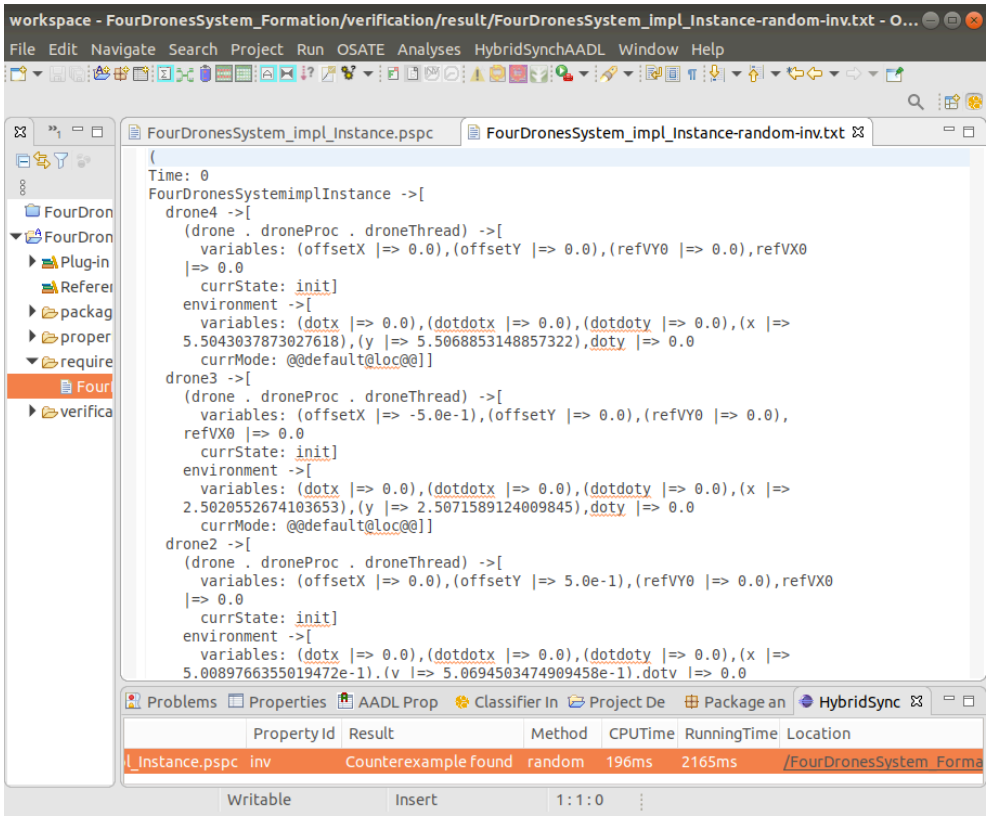
Analysis Results

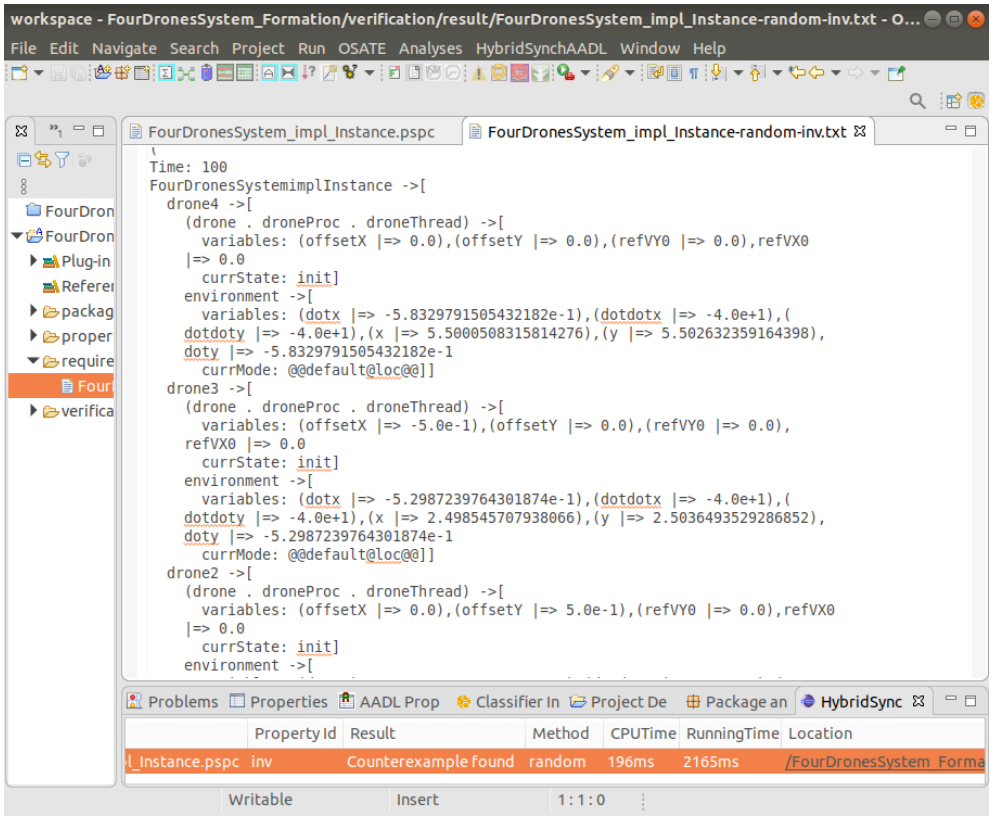
- The HybridSynchAADL Result view shows the analysis results.



Counterexample

- Each file in Location in the result view contains a counterexample of an invariant property if it exists.





Thank you!