

# **DEGAS Review Presentation:**

**Screenshots from the demonstration**

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# Choreographer: The editor in use

The screenshot displays the PEPA Net editor interface. On the left, a file tree shows the project structure under the path `/amd/nfs/wyvern/disk/ptn043/s9905941/`. The main editor window shows the model definition in `WEB1.pepa`:

```
// Really simple Web Browser Example
// 5 states

lambda = 0.05;
m=0.1;
g =0.01;
r=0.001;
mu= 1.0;

Browser = (display 0.4*lambda). (cache,m).Browser +
Encountered"Server" at line 12, column 47
(download,infity). (rel,r).Browser;
Server = (get,infity). (download,mu). (rel,infity)Server;
Browser<get,download,rel>Server
```

Below the editor, the state space is shown in `WEB1.states`:

```
1 Browser <(rel, get, download)> Server
2 (cache,m=0.1).Browser <(rel, get, download)> Server
3 (get,g=0.01).(download,1.0*Top).(rel,r=0.0010).Browser <
4 (download,1.0*Top).(rel,r=0.0010).Browser <(rel, get, do
5 (rel,r=0.0010).Browser <(rel, get, download)> (rel,1.0*T
```

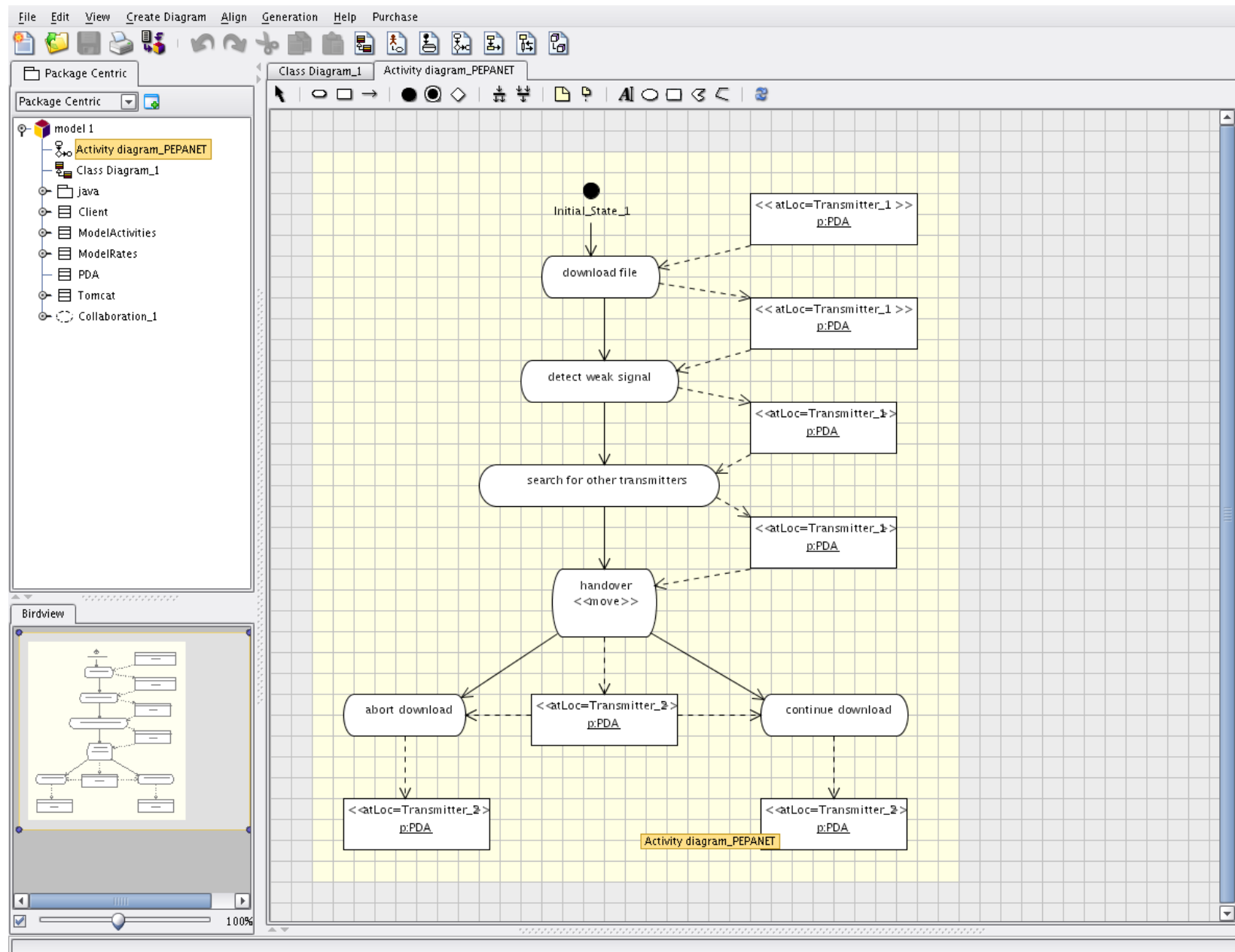
The steady state solution is shown in `WEB1.steadystate`:

```
1 0.0292141396435875
2 0.005842827928717501
3 0.08764241893076251
4 8.764241893076247E-4
5 0.876424189307625
```

The bottom panel, titled "Output - PEPA", shows the results of the state space exploration:

```
Exploring State Space
Number of States: 5
Calculating Transitions
Number of Transitions: 6
Uncompressed state space has been printed to file: /amd/nfs/wyvern/disk/ptn043/s9905941/nvh/degas/workbench/models/examples//WEB1.states
Approximate time to complete the derivation of the state space: 0.321 seconds
Attempting to solve via the Linear Biconjugate Gradient method
Generalised Minimum Residual variant of the Linear Biconjugate Gradient method invoked
Number of iterations: 4
Error Value :8.529560015958717E-18
Approximate time to compute the steady state solution: 0.0010 seconds
XML results have been printed to file: /amd/nfs/wyvern/disk/ptn043/s9905941/nvh/degas/workbench/models/examples//WEB1.xml
Steady State Solution has been printed to File: /amd/nfs/wyvern/disk/ptn043/s9905941/nvh/degas/workbench/models/examples//WEB1.steadystate
```

# Poseidon: viewing an activity diagram



# Choreographer: extracting a PEPA net

The screenshot displays the PEPA Net Extractor application window. The interface includes a menu bar (File, Edit, View, Tools, Window, Help, XMI, LySa, PEPA, PEPA Net), a toolbar, and a Filesystems pane on the left. The main editor shows the content of the file 'TomcatFinal2.5.0.pepanet', which was generated from 'TomcatFinal2.5.0.zum1'. A context menu is open over the file, with 'Extract PEPA Net' selected. The output pane at the bottom provides a detailed log of the extraction process.

```
// The following PEPA model was generated by the PEPA Net Extractor based on MDR
// From the file: /amd/nfs/wyvern/disk/ptn043/s9905941/nvh/Review/TomcatFinal2.5.0.zum1
// On: Saturday, April 2, 2005 6:58:43 PM BST

Definitions for mobile component
1 = (download_file,dow).PDA1;
2 = (detect_weak_signal,det).PDA2;
3 = (search_for_other_transmitters,sea).PDA3;
4 = (handover,han).PDA4;
5 = (continue_download,con).PDA5 + (abort_download,abo).PDA6;
6 = (restore,res).PDA;

Definitions for static components
Transmitter_1_Static = (download_file,infty).Transmitter_1_Static1;
Transmitter_1_Static1 = (detect_weak_signal,infty).Transmitter_1_Static2;
Transmitter_1_Static2 = (search_for_other_transmitters,infty).Transmitter_1_Static;
Transmitter_2_Static = (abort_download,infty).Transmitter_2_Static + (continue_download,infty).Transmitter_2_Static;

// Arcs
Transmitter_1 -(handover, han)-> Transmitter_2;
Transmitter_2 -(restore, res)-> Transmitter_1;

// Marking and cooperations
Transmitter_2 = PDA[_] <continue_download,abort_download> Transmitter_2_Static;
Transmitter_1 = PDA[PDA] <detect_weak_signal,download_file,search_for_other_transmitters> Transmitter_1_Static;

(Transmitter_2, Transmitter_1)
```

Output

```
PEPA XMI
Attempting to load file /amd/nfs/wyvern/disk/ptn043/s9905941/nvh/Review/TomcatFinal2.5.0.zum1.
Pre-processing file /amd/nfs/wyvern/disk/ptn043/s9905941/nvh/Review/TomcatFinal2.5.0.zum1...
XMI version 1.2
File TomcatFinal2.5.0.zum1 was successfully pre-processed.
Loading /amd/nfs/wyvern/disk/ptn043/s9905941/nvh/Review/TomcatFinal2.5.0.zum1 into MDR...
PEPA rates successfully generated.
File /amd/nfs/wyvern/disk/ptn043/s9905941/nvh/Review/TomcatFinal2.5.0.rates containing the model rates has been written.
PEPA Net Extractor was successful, PEPA Net stored in: /amd/nfs/wyvern/disk/ptn043/s9905941/nvh/Review/TomcatFinal2.5.0.pepanet
```

Save All finished.

# Choreographer: analysing a PEPA net

The screenshot displays the PEPA Net software interface. The main window, titled "TomcatFinal2.5.0.pepanet", shows the following content:

```
// The following PEPA model was generated by the PEPA Net Extractor based on MDR
// From the file: /amd/nfs/wyvern/disk/ptn043/s9905941/nvh/Review/TomcatFinal2.5.0.zum1
// On: Saturday, April 2, 2005 6:58:43 PM BST

// Definitions for mobile component
download_file,dow).PDA1;
detect_weak_signal,det).PDA2;
search_for_other_transmitters,sea).PDA3;
store,han).PDA4;
continue_download,con).PDA5 + (abort_download,abo).PDA6;

// Static components
Transmitter_1 = (download_file,infy).Transmitter_1_Static1;
Transmitter_1 = (detect_weak_signal,infy).Transmitter_1_Static2;
Transmitter_1 = (search_for_other_transmitters,infy).Transmitter_1_Static;
Transmitter_2 = (abort_download,infy).Transmitter_2_Static + (continue_download,infy).Transmitter_2_Static;

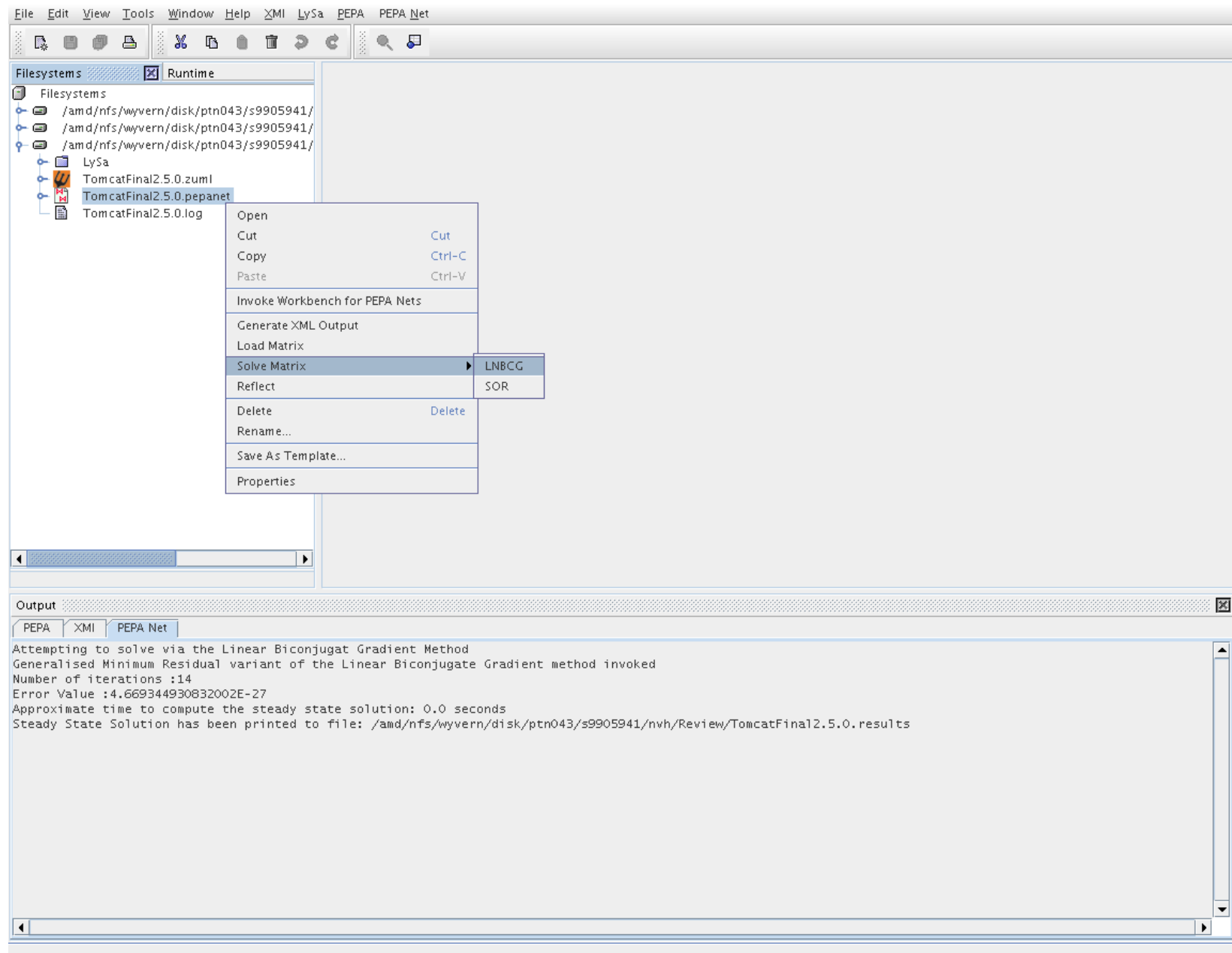
// Marking and cooperations
Transmitter_2 = PDA[_] <continue_download,abort_download> Transmitter_2_Static;
Transmitter_1 = PDA[PDA] <detect_weak_signal,download_file,search_for_other_transmitters> Transmitter_1_Static;

(Transmitter_2, Transmitter_1)
```

The interface includes a menu with options such as "Open", "Cut", "Copy", "Paste", "Invoke Workbench for PEPA Nets", "Generate XML Output", "Load Matrix", "Solve Matrix", "Reflect", "Delete", "Rename...", "Save As Template...", and "Properties". The "Output" window at the bottom shows the following log:

```
>PEPA Workbench for PEPA Nets Version 0.86.1 "Little France" [01-April-2005]
>[ Identifiers will not be hashed ]
>Processing input from /amd/nfs/wyvern/disk/ptn043/s9905941/nvh/Review/TomcatFinal2.5.0.pepanet
>Compiling the model
>Generating the derivation graph
>The model has 7 states
>The model has 5 transitions
>The model has 3 firings
>Exiting PEPA Workbench.
```

# Choreographer: solving the Markov chain



# Choreographer: reflecting to UML

The screenshot displays the PEPA Net software interface. The main window shows a PEPA Net model for 'TomcatFinal2.5.0.pepanet'. A context menu is open over the file 'TomcatFinal2.5.0', with the 'Reflect' option selected. The PEPA Net code in the main window includes definitions for mobile components, static components, and marking and cooperations. The output window at the bottom shows the results of the reflection process.

```
// The following PEPA model was generated by the PEPA Net Extractor based on MDR
// From the file: /amd/nfs/wyvern/disk/ptn043/s9905941/nvh/Review/TomcatFinal2.5.0.zum1
// On: Saturday, April 2, 2005 6:58:43 PM BST

// Definitions for mobile component
(download_file,dow).PDA1;
(detect_weak_signal,det).PDA2;
(search_for_other_transmitters,sea).PDA3;
(over,han).PDA4;
(continue_download,con).PDA5 + (abort_download,abo).PDA6;
(store,res).PDA;
(over,res).PDA;

// Static components
Transmitter_1 = (download_file,infty).Transmitter_1_Static1;
Transmitter_1 = (detect_weak_signal,infty).Transmitter_1_Static2;
Transmitter_1 = (search_for_other_transmitters,infty).Transmitter_1_Static;
Transmitter_2 = (abort_download,infty).Transmitter_2_Static + (continue_download,infty).Transmitter_2_Static;

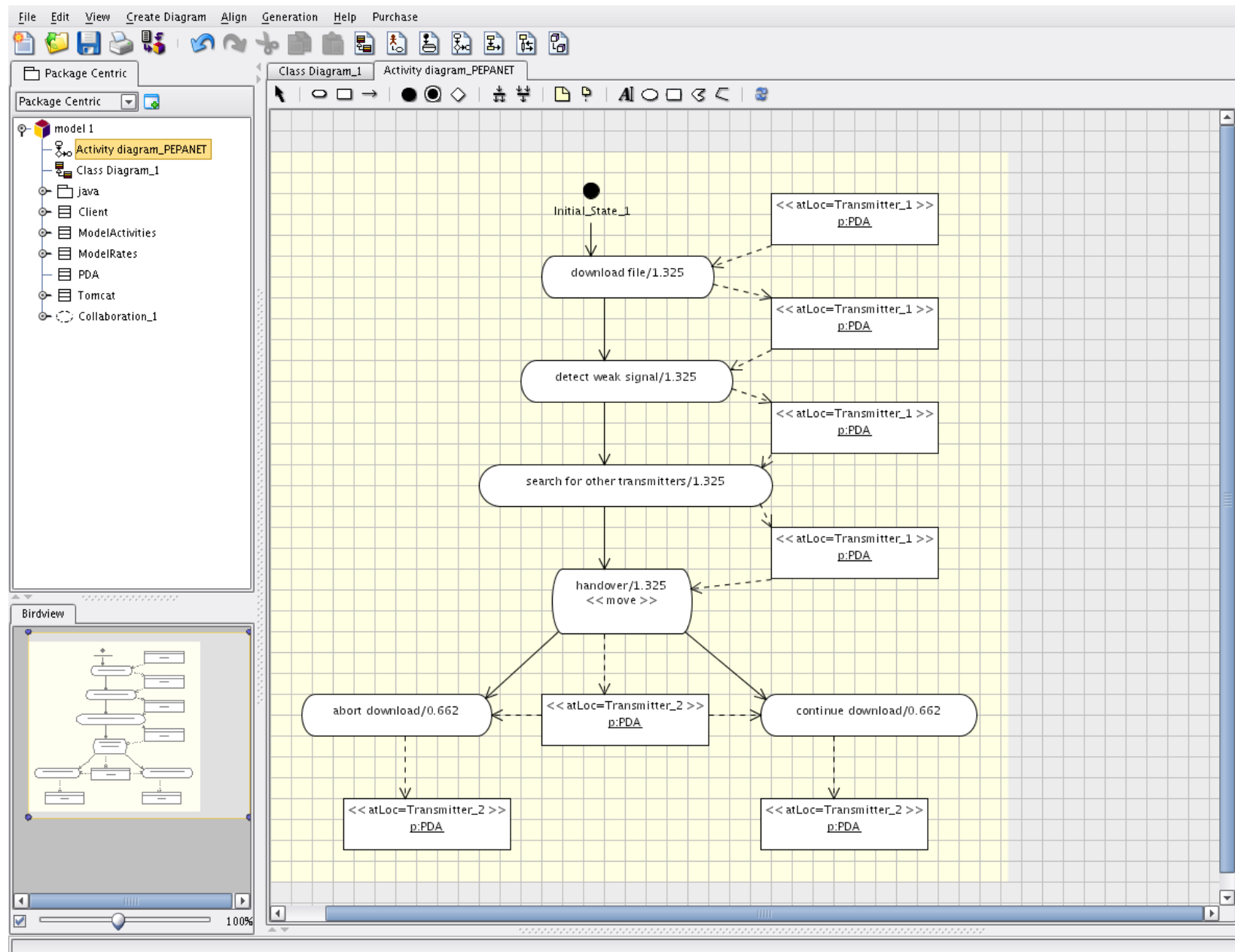
// Marking and cooperations
Transmitter_2 = PDA[_] <continue_download,abort_download> Transmitter_2_Static;
Transmitter_1 = PDA[PDA] <detect_weak_signal,download_file,search_for_other_transmitters> Transmitter_1_Static;

(Transmitter_2, Transmitter_1)
```

Output window (PEPA Net):

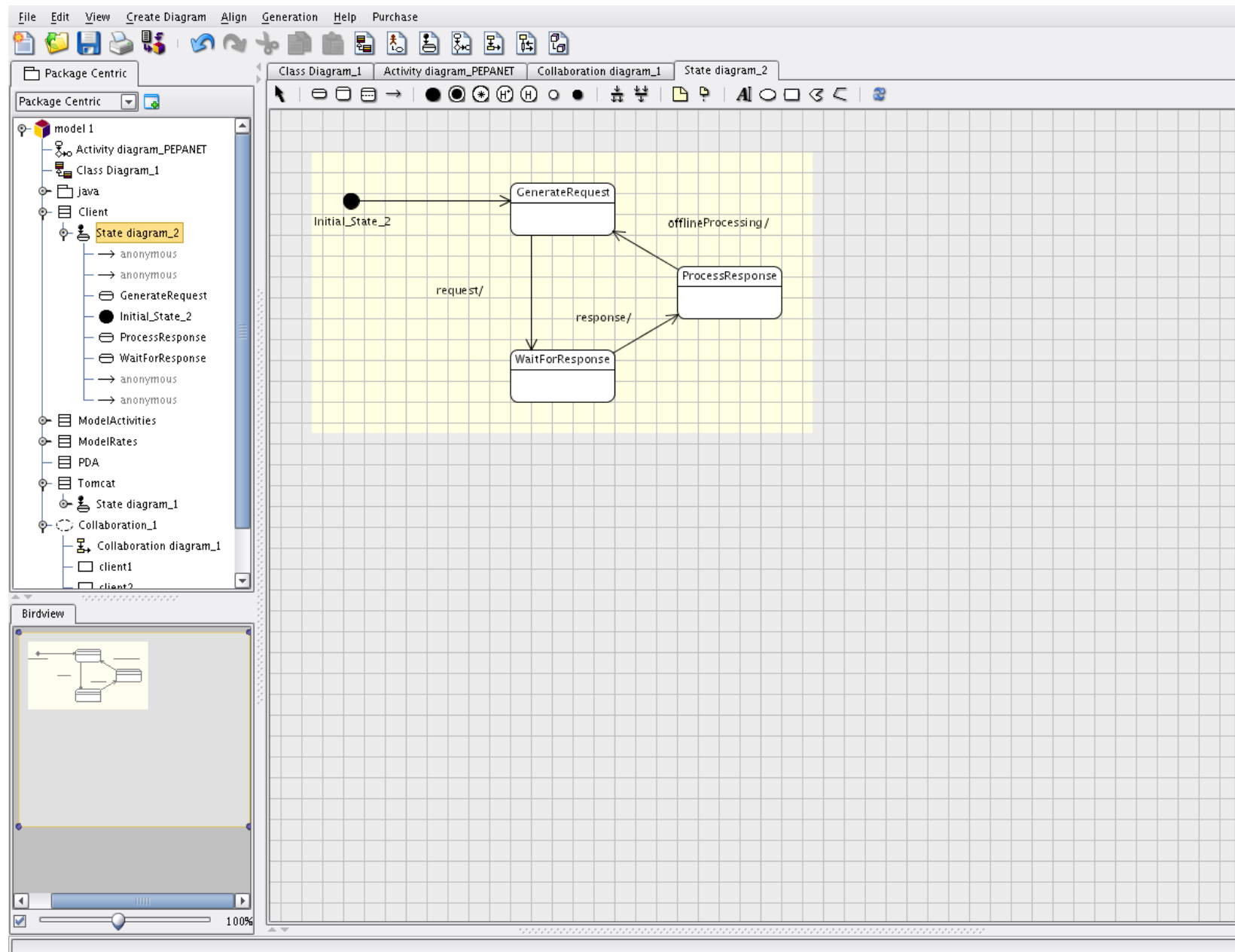
```
Reflector has been instantiated
Attempting to load file /amd/nfs/wyvern/disk/ptn043/s9905941/nvh/Review/TomcatFinal2.5.0.zum1.
Pre-processing file /amd/nfs/wyvern/disk/ptn043/s9905941/nvh/Review/TomcatFinal2.5.0.zum1...
XMI version 1.2
File TomcatFinal2.5.0.zum1 was successfully pre-processed.
Loading /amd/nfs/wyvern/disk/ptn043/s9905941/nvh/Review/TomcatFinal2.5.0.zum1 into MDR...
Merging model in MDR with Poseidon diagram data...
Merge successfully completed.
Result of merge written to temporary file /tmp/TomcatFinal2.5.0.zum1.reflected413.xmi.
Reflected UML/XMI has been printed to file: /amd/nfs/wyvern/disk/ptn043/s9905941/nvh/Review/TomcatFinal2.5.0.mobility.zum1
```

# Poseidon: viewing the result

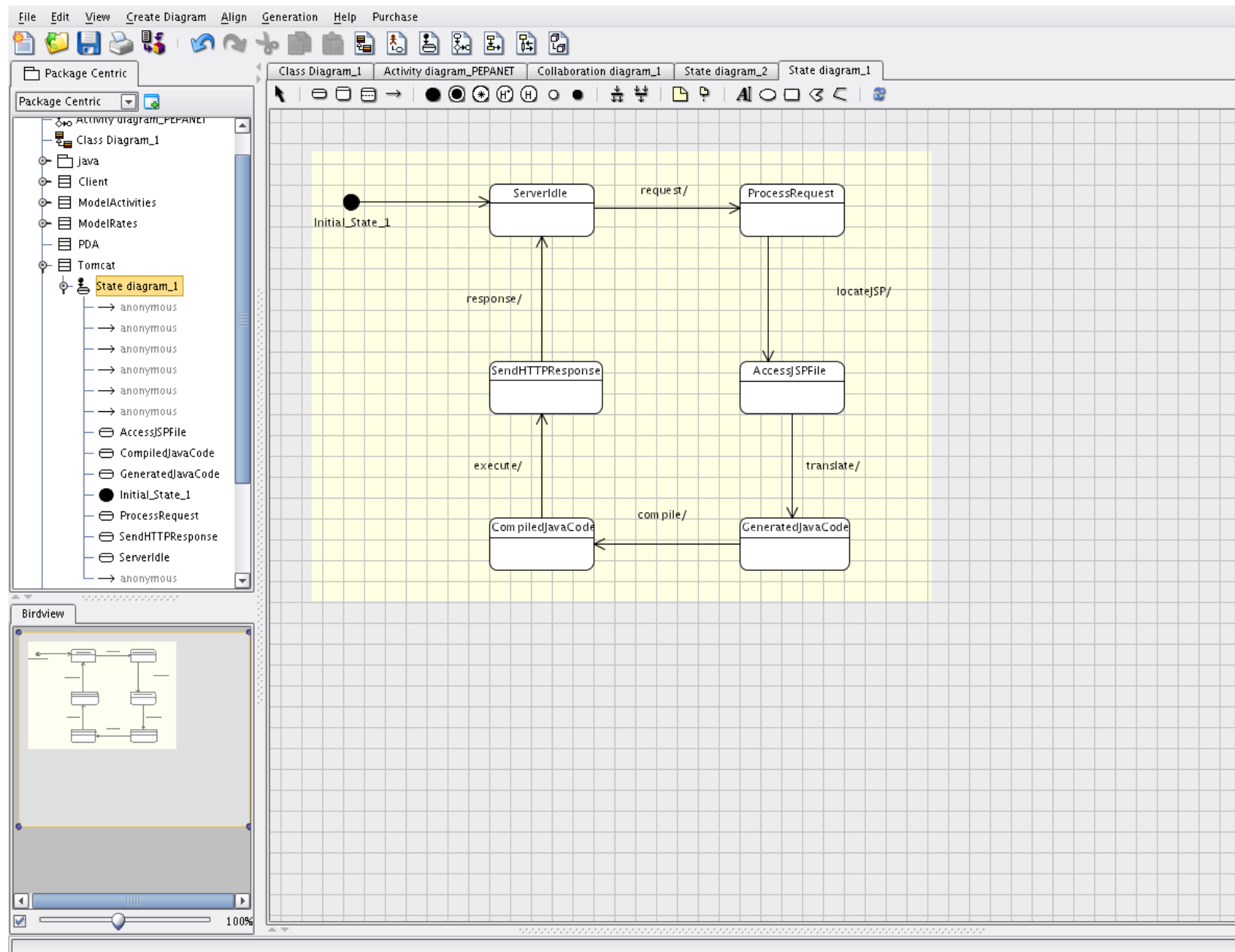




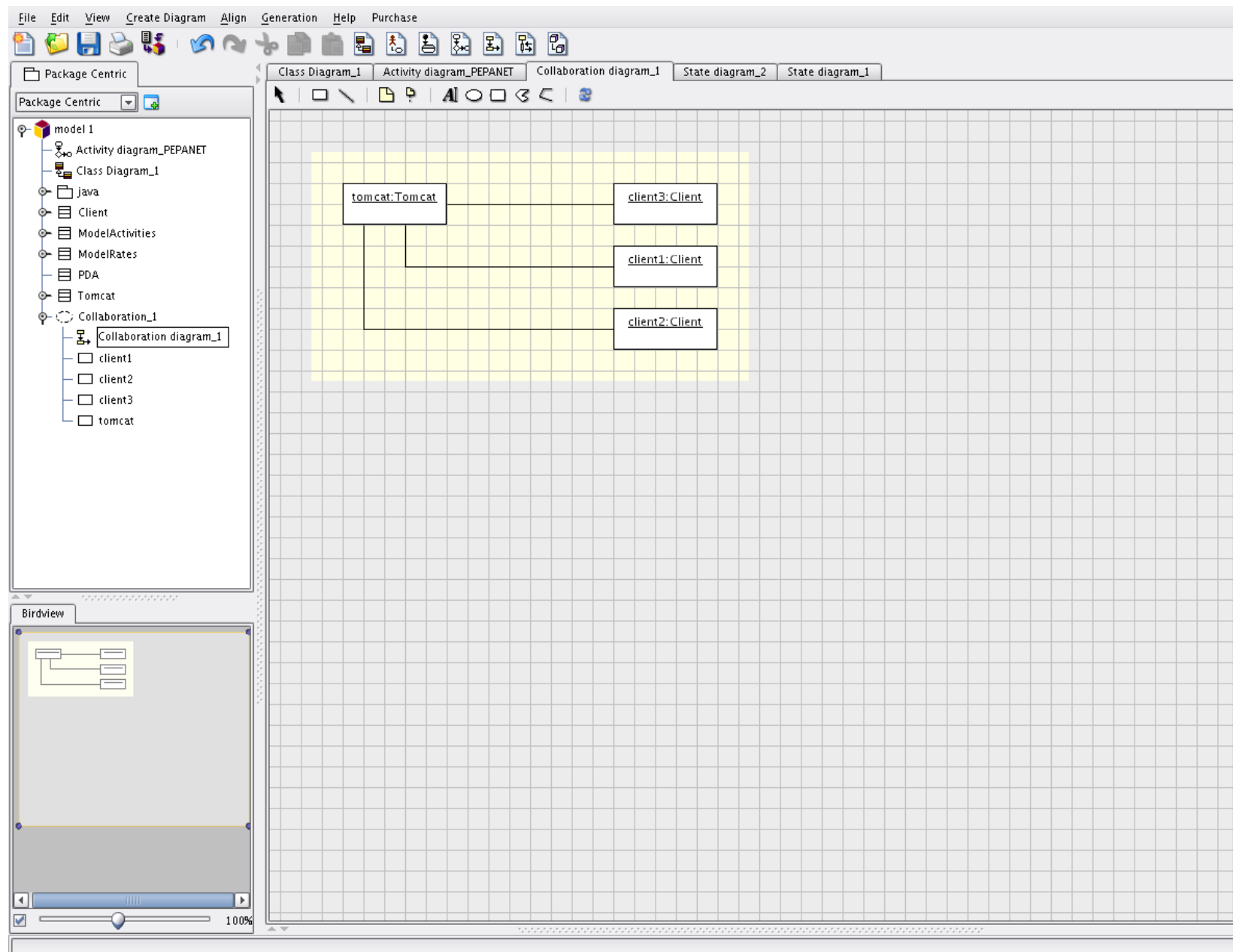
# Poseidon: state diagram of a mobile client



# Poseidon: state diagram of a Tomcat server



# Poseidon: clients and server collaborate



# Choreographer: extracting a PEPA model

The screenshot displays the PEPA Net application interface. The main window shows a file tree on the left with 'TomcatFinal2.5.0' selected. A context menu is open over this file, with 'Extract PEPA' highlighted. The main editor area displays the generated PEPA model code, which includes a header comment and a list of processes with their respective rates and actions. The processes are: generateRequest (rate 2.0, action (request, req).waitForResponse), waitForResponse (rate 1.0, action (response, infty).ProcessResponse), processResponse (rate 2.0, action (offlineProcessing, opr).GenerateRequest), serverIdle (rate 10, action (request, infty).ProcessRequest), processRequest (rate 100, action (locateJSP, jsp).AccessJSPFile), accessJSPFile (rate 0.01, action (translate, tran).GeneratedJavaCode), generatedJavaCode (rate 0.25, action (compile, cmp).CompiledJavaCode), compiledJavaCode (rate 0.01, action (execute, exec).SendHTTPResponse), and sendHTTPResponse (rate 0.25, action (response, rsp).ServerIdle). The model is defined as ((GenerateRequest <-> GenerateRequest) <-> GenerateRequest) <request, response> ServerIdle.

```
// The following PEPA model was generated by the PEPA Extractor for XMI 1.2
// From the file: /amd/nfs/wyvern/disk/ptn043/s9905941/nvh/Review/TomcatFinal2.5.0.zuml
// On: Saturday, April 2, 2005 7:03:12 PM BST

= 2.0;
n = 1.0;
c = 2.0;
= 0.01;
= 10;
= 100;
= 0.01;
= 0.25;

generateRequest = (request, req).waitForResponse;
waitForResponse = (response, infty).ProcessResponse;
processResponse = (offlineProcessing, opr).GenerateRequest;

serverIdle = (request, infty).ProcessRequest;
processRequest = (locateJSP, jsp).AccessJSPFile;
accessJSPFile = (translate, tran).GeneratedJavaCode;
generatedJavaCode = (compile, cmp).CompiledJavaCode;
compiledJavaCode = (execute, exec).SendHTTPResponse;
sendHTTPResponse = (response, rsp).ServerIdle;

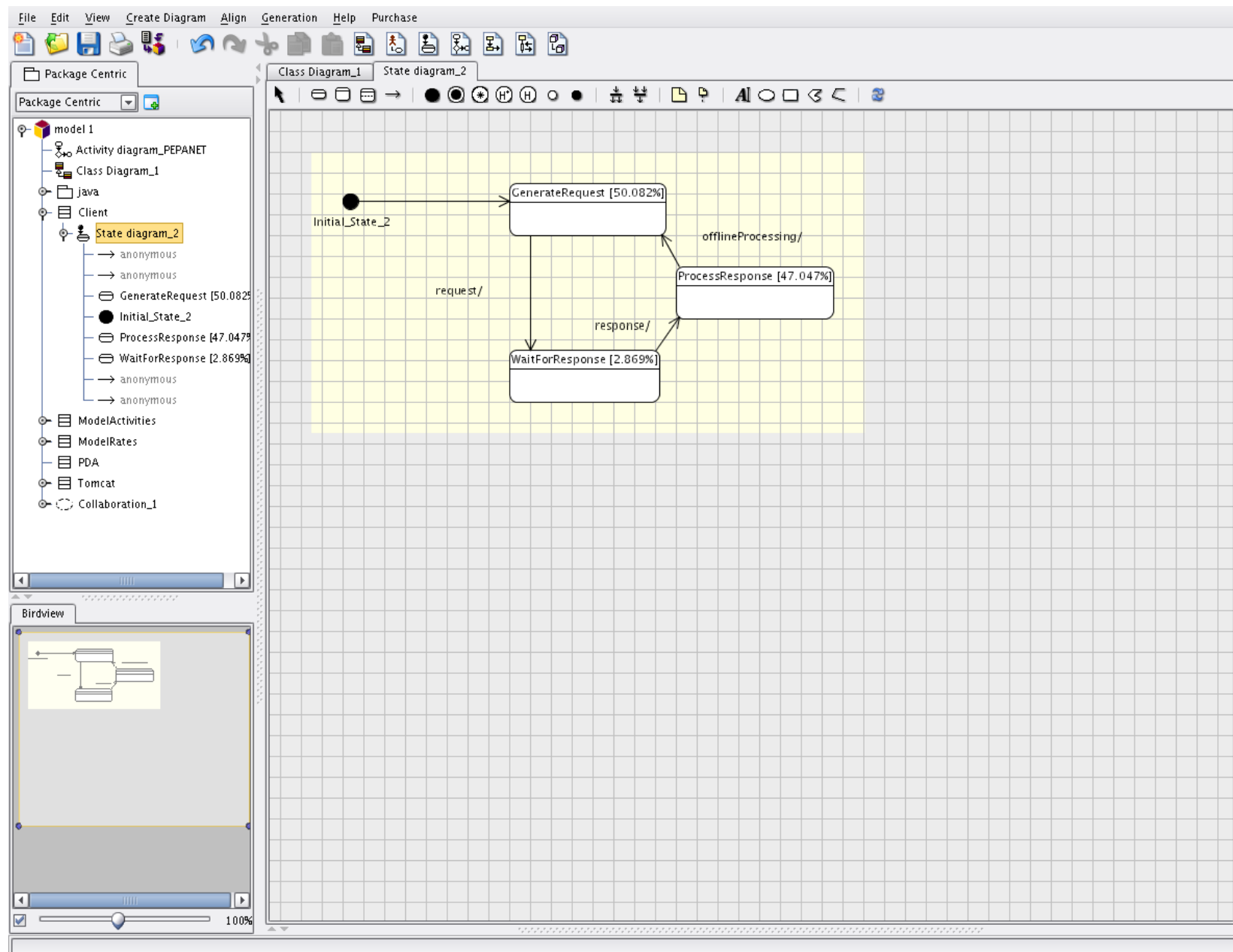
((GenerateRequest <-> GenerateRequest) <-> GenerateRequest) <request, response> ServerIdle
```

The Output window at the bottom shows the following text:

```
PEPA XMI PEPA Net
UML input found in file: /amd/nfs/wyvern/disk/ptn043/s9905941/nvh/Review/TomcatFinal2.5.0.zuml
Now generating PEPA
xmi 1.2
There are several interaction diagrams, trying to find the correct Collaboration Diagram
Collaboration Diagram has been found.
```



# Poseidon: client state residences



# Poseidon: modifying the Tomcat state diagram

The screenshot displays the Poseidon IDE interface for editing a state diagram. The main workspace shows a state diagram with the following elements:

- States:** Initial\_State\_1, ServerIdle, ProcessRequest, SendHTTPResponse, AccessJSPFile, CompiledJavaCode, and GeneratedJavaCode.
- Transitions:**
  - Initial\_State\_1 to ServerIdle (no label)
  - ServerIdle to ProcessRequest (label: request/)
  - ProcessRequest to SendHTTPResponse (label: anonymous)
  - ProcessRequest to AccessJSPFile (label: locateJSP/)
  - AccessJSPFile to GeneratedJavaCode (label: translate/)
  - GeneratedJavaCode to CompiledJavaCode (label: compile/)
  - CompiledJavaCode to SendHTTPResponse (label: execute/)
  - SendHTTPResponse to ServerIdle (label: response/)

The Properties window at the bottom right is configured for a transition from ProcessRequest to SendHTTPResponse:

- Name:** (empty)
- Trigger:** locateServlet
- Guard:** <none>
- Effect:** rate(s)
- Source:** ProcessRequest
- Target:** SendHTTPResponse

The Package Centric view on the left shows the project structure, including the state diagram being edited. The Birdview window at the bottom left provides a small overview of the entire state diagram.

Wrote /amd/nfs/nyvern/disk/ptn043/s9905941/mvh/degas/choreographer/test\_models/PEPA-Nets/TomcatFinal3.0.zuml

# Poseidon: modified client state residences

