

# Introduction to Java and Agent-Based Economic Platforms (CF-904)

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## 3. Introduction to JAS

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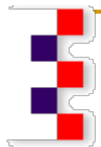
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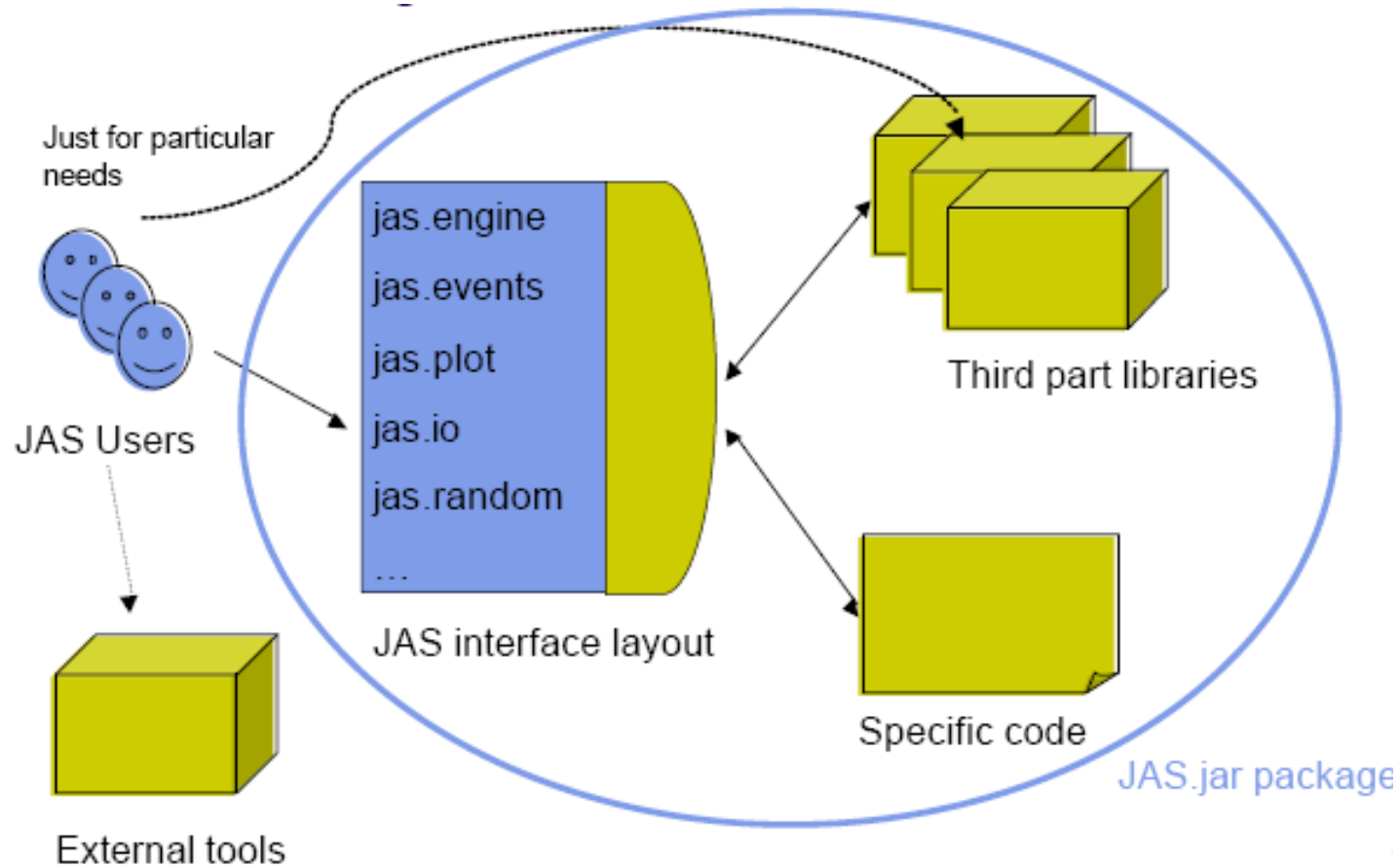
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# What is JAS

- An open source collection of tools to build ABMs
  - Based on the Swarm paradigm
  - Written using Java and XML
  - Founded on 3rd party well-tested open-source libraries
- An application that loads, executes and controls simulation experiments
  - XML project files contain information like list of models to run, classpaths, seed number, windows layout, etc.

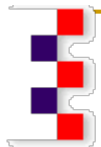


# The JAS.jar architecture



# Third part libraries in JAS

Library	Author	Use
<i>ptPlot</i>	<i>Berkley University</i>	Plotting
<i><a href="http://ptolemy.eecs.berkeley.edu/java/ptplot/index.htm">http://ptolemy.eecs.berkeley.edu/java/ptplot/index.htm</a></i>		
<i>COLT</i>	<i>CERN</i>	Random generation and statistics
<i><a href="http://nicewww.cern.ch/~hoschek/colt/index.htm">http://nicewww.cern.ch/~hoschek/colt/index.htm</a></i>		
<i>jExcelApi</i>	<i>Andy Khan</i>	Microsoft Excel format I/O
<i><a href="http://www.andykhan.com/jexcelapi/index.html">http://www.andykhan.com/jexcelapi/index.html</a></i>		
<i>SVG-Batik</i>	<i>Apache</i>	SVG image generation
<i><a href="http://xml.apache.org/batik/index.html">http://xml.apache.org/batik/index.html</a></i>		
<i>XML-RPC</i>	<i>Apache</i>	Sim2Web's remote calls
<i><a href="http://xml.apache.org/xmlrpc">http://xml.apache.org/xmlrpc</a></i>		



# The JAS application

JAS models are stand alone applications based on the JAS library but they can be managed as they were documents thanks to the XML project document.

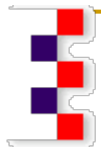
JAS is able to load models and drop them from memory without shutting down the JVM

## How to create a model

1. Type code
2. Compile it
3. Generate XML project →

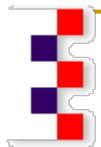
## The HeatBugs project file:

```
<?xml version="1.0" encoding="UTF-8" ?>
: <JAS projectName="ObsHeabugs">
:   <ProjectParameters>
:     <TimeUnit>7</TimeUnit>
:     <MajorVersion>0</MajorVersion>
:     <Seed randomSeed="true">1020968840339</Seed>
:     <ProjectDescription>Model with observer
:       example.</ProjectDescription>
:   </ProjectParameters>
:   <Model className="HeatBugsModel">
:     <Window title="Heatbugs">5,130,400,400</Window>
:   </Model>
:   <Model className="HeatBugsObserver">
:     <Window title="Unhappiness">
:       504,380,500,300</Window>
:     <Window title="Space viewer">
:       626,23,320,320</Window>
:   </Model>
:   <ClassPath>
:     <Path>.\examples\HeatBugs</Path>
:   </ClassPath>
: </JAS>
```



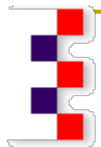
# JAS' highlights

- Real time execution mode
- Sim2Web: a Jas-Zope bridge architecture to publish simulations on the web
- *jas.engine.AgentList* allows asynchronous method execution
- GA, ANN, CS native packages (under construction)
- A multi-run template class for automatic parameter calibration
- Some of the turtles' instructions from Starlogo
- Desktop GUI application mode

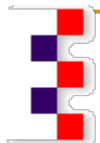
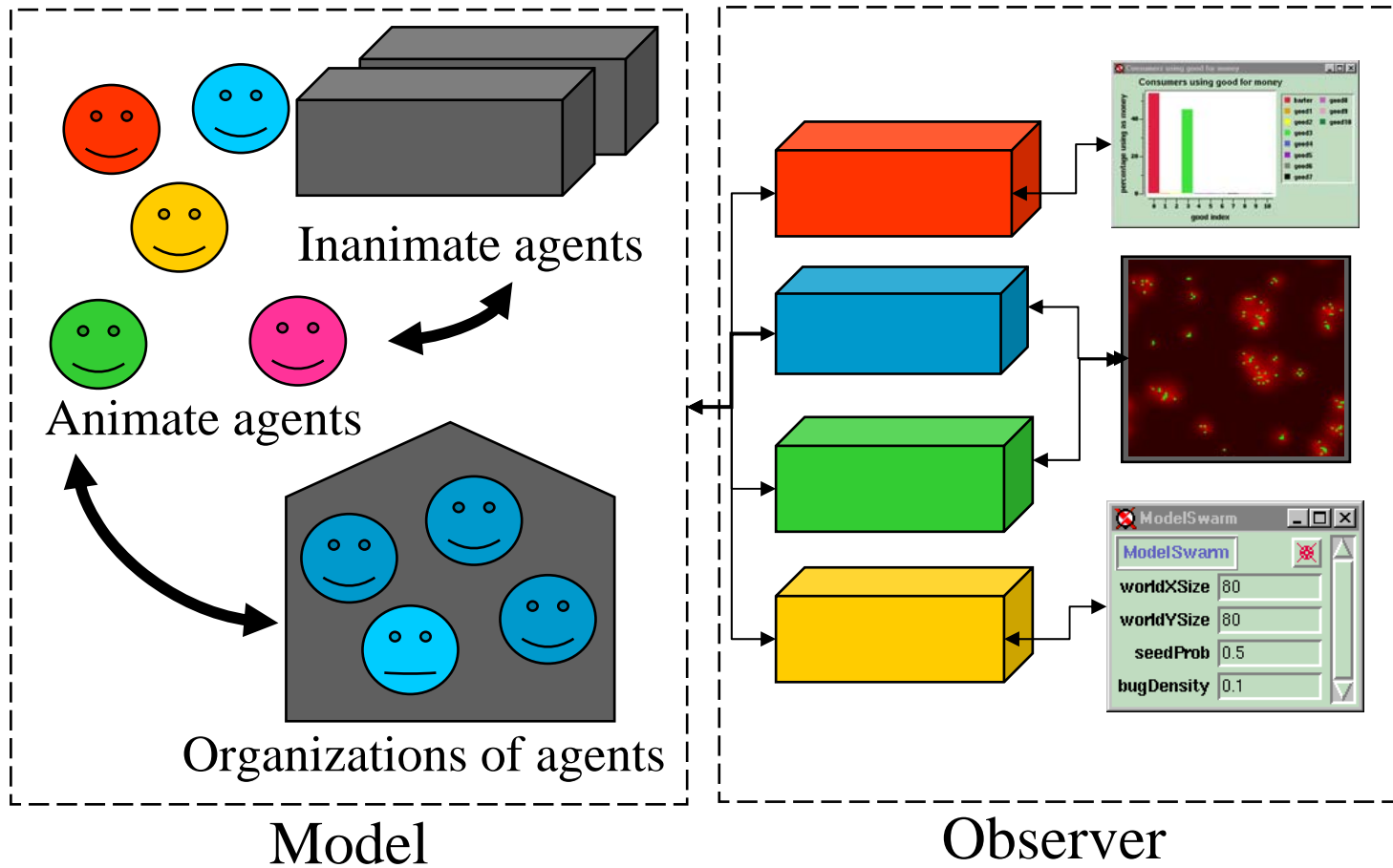


# The JAS' structure

<i>jas.engine</i>	Simulation engine, time manager, GUI layer.
<i>jas.events</i>	The event architecture
<i>jas.io</i>	General purpose I/O classes supporting CSV, Excel and XML formats
<i>jas.net</i>	Network tools (Sim2Web, remote controlling, ...)
<i>jas.plot</i>	The plotting tools (mostly based on <i>ptPlot</i> library)
<i>jas.probe</i>	The probe library (similar to the Swarm's probes)
<i>jas.random</i>	A rich pseudo-random generation library (mostly based on the COLT library)
<i>jas.space</i>	Bi-dimensional grids, cellular automata, etc.
<i>jas.stats</i>	Statistical probes



# Objects in an Agent-Based Model



# First steps with JAS

- Random model
  - [http://www.essex.ac.uk/ccfea/Teaching/CF902/data\\_and\\_software\\_for\\_ACE.htm](http://www.essex.ac.uk/ccfea/Teaching/CF902/data_and_software_for_ACE.htm)

