

SML Tutorial

Soar Workshop 32 – Nate Derbinsky

While waiting...

1. Make sure you have internet access
2. Download Soar Tutorial package v9.3.2
code.google.com/p/soar/wiki/SoarTutorial
3. Download Eclipse (with at least Java)
www.eclipse.org
4. Download tutorial support files
web.eecs.umich.edu/~nlderbin/workshop32

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Agenda

- Big picture
- System setup + Hello Soar
- Basic usage
- Additional resources

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Big Picture: Soar Markup Language

- SML provides a programmatic interface into Soar based around sending and receiving commands packaged as XML packets. Used for...
 - Environments
 - Debuggers
 - Automated experimentation
- Written in C++
- Exported, via SWIG (swig.org) to...
 - Python
 - Java

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System Setup (1)

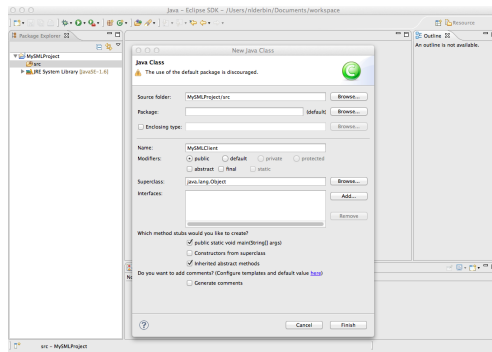
1. Open Eclipse
2. New Java Project
 - Name="MySMLProject"
 - Finish
3. New Class
 - Name="MySMLClient"
 - Check: "public static void main..."
 - Finish

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Status



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System Setup (2)

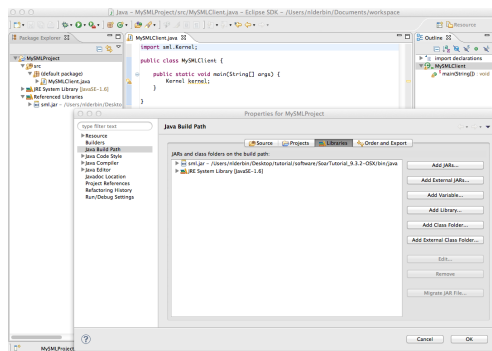
4. Inside main...
`Kernel kernel;`
5. Add `sml.jar` to class path
 - Right click project -> Properties
 - Java Build Path
 - Libraries -> Add External Jar
 - Locate `sml.jar` in `bin/java`, Open, OK
6. Hover over “Kernel” (red underline)
 - Click “Import ‘Kernel’ (sml)”

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System Setup (3)

7. Finish main ...
`Kernel kernel = Kernel.CreateKernelInNewThread();`
`Agent agent = kernel.CreateAgent("soar");`

`System.out.println(agent.ExecuteCommandLine("print s1"));`

`kernel.Shutdown();`

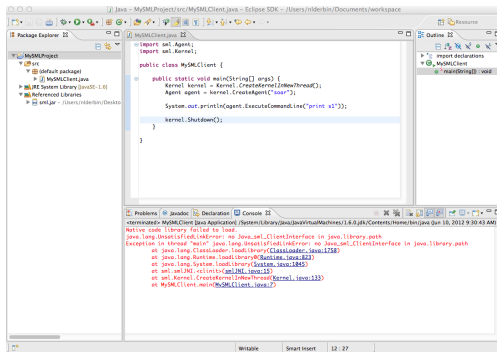
8. Run menu -> Run

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System Setup (4)

9. Run menu -> Run Configurations

– Environment tab

– New

• Name=

– Mac: DYLD_LIBRARY_PATH

– Linux: LD_LIBRARY_PATH

– Windows: PATH

• Value=“/path/to/soar/release/bin” (no quotes)

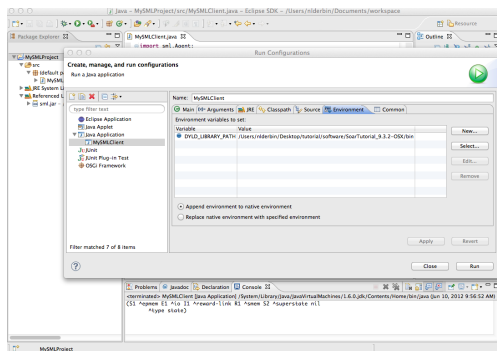
• Run

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Misc. Issues

• OS

– Mac: Lion (v10.7) supported

– Linux: Needs g++ v4.6 (in Ubuntu v11.10)

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Basic Usage

Part 1: Automation

- Command execution
- Loading rules
- Synchronous run control
- Capturing trace output

Part 2: Basic IO

- Managing WMEs on input-link
- Read output-link WMEs + feedback

Part 3: Event-Driven Environment

- Output handler

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Command Execution

Syntax

```
"result"=agent.ExecuteCommandLine("command");
```

Try

- "stats"
- "epmem --stats"
- "sp {test (state <s> ^superstate nil) --> (<s> ^foo bar)}"
- "print test"

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Loading Rules

Syntax

```
True/False = Agent.LoadProductions("location");
```

Try

1. Load: goodbye .soar
2. Execute: "print goodbye"

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Synchronous Run Control

Syntax

- Agent.RunSelf(numberSteps,stepSize = Decision);
- Agent.RunSelfForever();
- Agent.RunSelfTilOutput();
- Agent.ExecuteCommandLine("run...");

Try

1. Load: goodbye .soar
2. Run: forever
3. Execute: "print s1"

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Capturing Trace Output

print.java

1. Create a PrintEventInterface (event handler)

```
public static final PrintEventInterface myPrinter = new PrintEventInterface() {
    public void printEventHandler(int eventId, Object data, Agent agent, String message) {
        System.out.println("Soar said: <" + message + ">");
    }
};
```

2. Register for Event

Syntax

```
Agent.RegisterForPrintEvent(eventId, handler, extraData);
```

Try

```
agent.RegisterForPrintEvent(smlPrintEventId.smlEVENT_PRINT, myPrinter, null);
```

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Managing WMEs on input-link

input.java

Syntax

- Identifier = Agent.GetInputLink();
- Identifier = Identifier.CreateIdWME("attr");
- FloatElement = Identifier.CreateFloatWME("attr", value);
- IntElement = Identifier.CreateIntWME("attr", value);
- WMElement.DestroyWME();

Task. Add and remove WMEs of differently typed values to the input-link. Use execution and run-control to verify via System printing.

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Read output-link WMEs + Feedback

output.java

Syntax

- Int = Agent.GetNumberCommands();
- Identifier = Agent.GetCommand(Int);
- String = WMElement.GetAttribute();
- Int = Identifier.GetNumberChildren();
- WMElement = Identifier.GetChild(Int);
- WMElement = Identifier.FindByAttribute(String, Int)
- *Element = WMElement.ConvertTo*Element();
- Identifier.AddStatus<< Complete Error >>();

Task. Have an agent produce output. Parse via SML and provide feedback to the agent. Verify via agent action and working memory inspection.

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Output Handler

handler.java

Syntax

- Agent.AddOutputHandler("cmd", handler, data);

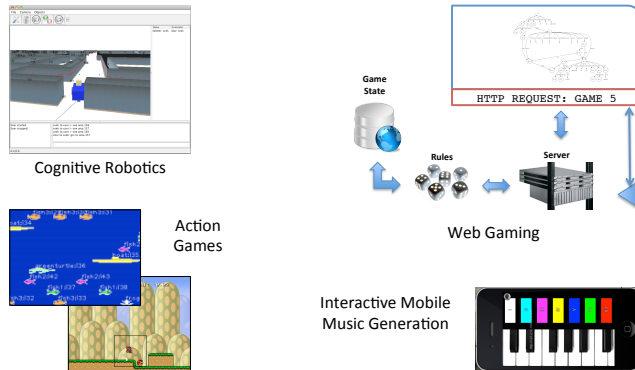
Task. Choose a secret number. Have a Soar agent guess the value via output commands until correct.

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SML Example Environments



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Additional Resources

- Quick Start Guide
code.google.com/p/soar/wiki/SMLQuickStartGuide
- Threads in SML
code.google.com/p/soar/wiki/ThreadsInSML

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