Advanced Java Programming: part 2 – tutor guide

structure & emphasis

Part 2 of AJP covers three areas (i) concurrency (ii) an introduction to generic agents and (iii) middleware. The emphasis is to develop students' practical skills in these areas but this also requires students to have a good understanding of the underlying concepts.

The three areas each account for approximately $1/3^{rd}$ of the time available for AJP part-2. Allowing for one session to introduce part 2 of the module and another to discuss the brief for the assessment, this leaves roughly 3+ sessions for each topic. For students at Teesside each session will involve a lecture, a formal workshop/tutorial and some self-study time.

concurrency

There are various scenarios which could be used to investigate concurrency, we use simple animated graphics for this. The sessions are organised as follows...

session 1

outline of the scenario and the essential problem (see intro to threading using basic graphics – part 1)

sessions 2 & 3

explore the use of threads, their organisation & synchronisation (see threading using basic graphics – part 2)

tutorial work

this is based on a series of exercises which form the basis of an investigation into the concepts discussed in lectures

agency

Agents & multiagent systems (MAS) is a significant computer science research area in its own right. There are various types of agents and many issues based around their use and organisation. The purpose of introducing agents in this module is to expose students to new types of systems architecture, new types of sub-component interaction and give them experience of developing distributed code.

The module uses a generic agent framework (as opposed to some specific framework like BDI for example). We currently use "Boris" (available for download at www.agent-domain.org) which is later used to guide the design of middleware.

session 1-2

an introduction to MAS & Boris. The practical work associated with this session (see the chat-room example) gets students to build their first Boris agents.

sessions 2-3

investigates how to use the Boris IDE to monitor & deploy agents by design a multiagent system and consider how it can be specified & deployed using Boris. Tutorial work is based on building a simple distributed version of "ping pong" (an early arcade game).

Tutors: any MAS containing 2 or more agent types can be used as a case study for sessions 2-3, eg...

1. *the mine clearance example reworked for a generic agent platform like Boris. A NetLogo version of this example can be found on this site at* http://www.scm.tees.ac.uk/isg/website/netlogo/nlboris/mine-clear -- 1d.nlogo *and a BDI version in 2APL is described at* http://www.scm.tees.ac.uk/isg/website/lecture/mas/AJP2/2APL brief eg.ppt
2. *resource allocation for cloud computing*

middleware

using the paper describing the implementation of Boris as an example, sessions work through the steps needed to build distributed middleware with messaging passing capability.

session 1

an introduction to middleware including its capabilities & design compromises

sessions 2-3

using meta-agent building blocks to construct middleware (including white-page systems, socket-based communication, etc).

Tutors: the work presented in sessions 2-3 may be based heavily on the paper describing the implementation of Boris.

tutorial work & assessment

the tutorial work for these sessions are used to provide support for the course assessment