CS3250

Distributed Systems

lecture slides 2010/2011

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Learning Outcomes

at the end, you should be able to:

- name successful/typical DS applications, explain their main features
- describe main DS architectures and frameworks, main differences between them
- analyse DS requirements and design a suitable solution
- develop simple DS using
  - Java Message Service (JMS)
  - Java Remote Method Invocation (RMI)
  - Web Services (REST and SOAP) in Java

assuming:

- general Java — good command
- Java networking, multi-threading — some experience
- XML and XML Schema — some experience

Units

1. Introduction (motivation, definition, classification)
2. Messaging and P2P (JMS, essence of P2P DS)
3. Client-server DS (tiered architectures, scalability)
4. Java RMI (distributed objects, Java serialisation)
5. RESTful Web Services (REST over HTTP, XML serialisation)
6. Simple Web Services (SOAP-RPC, WSDL)
7. Service orientation (SOA, service registry, WS standards)
8. Stateful Web Services (WS resources, WS notification)
9. High performance DS (eg grids, MPI)

Anticipated Timetable

	Monday		Thursday	Friday	
week	date	lecture	lecture	practical	
1	Oct 4	0–1 (intro)	1	**1**	
2	Oct 11	2 (jms+p2p)	3 (c-s)	**2 quiz**	
3	Oct 18	4A (rmi1)	4A	**4**	
4	Oct 25	4B (rmi2)	4B	**4 quiz**	
5	Nov 1	5 (rest ws)	5	**5**	cwk (5)
6	Nov 8	5	5	**5**	↕
7	Nov 15	6 (soap ws)	6	**cwk**	**cwk**
8	Nov 22	6	7 (soa)	**6**	
9	Nov 29	8 (ws res)	8 (notif)	**6 quiz**	
10	Dec 6	9 (grid)	9 (mpi)	**open**	
11	Dec 13	catch-up + revision			

Weekly Contact Hours

- 2 lectures (1 hour each)
  - lecture slides and notes on BB, printouts in lectures
  - small exercises $\longrightarrow$ time to think, practice
  - medium tasks $\longrightarrow$ learn abstract ideas
  - model answers available later
- 1 practical (1 hour each)
  - small programming exercises in the lab
  - model solution's resulting code available later
  - some practicals assessed via BB

Assessment

- Coursework (15%)
  - specification given in week 5 (probably)
  - hand-in in week 8 (probably)
  - feedback in week 11 (will do my best)
- Assessed practicals (10%)
  - altogether 3 of them, best 2 count
  - feedback and score available within 1 week
- Examination (75%)
  - in January, length 2 hours
  - 1 past paper avialable on BB
  - compulsory section A with short questions
  - choice of 2 out of 3 deeper questions in section B

Main literature

- **Coulouris et al**: *Distributed Systems, Concepts and Designs (4th ed.)*, Addison-Wesley 2005
  (good comprehensive overview and introduction)
- **Richardson & Ruby**: *RESTful Web Services*, O'Reilly 2007
  (on Safari)
- **Farley**: *Java Distributed Computing*, O'Reilly 1998
  (on Safari, thorough threatment of RMI)
- **Papazoglou**: *Web services, principles and technology*, Pearson/Prentice Hall, 2008
  (comprehensive treatment of WS)
- **Sotomayor, Childers**: *Globus Toolkit 4*, Morgan Kaufmann 2006
  (good tutorial for stateful WS, online version)