Distributed Systems

Part 2, Part 2 (General) and Diploma, Easter term 2004
Jean Bacon (jmb@cl.cam.ac.uk)

Distributed Systems - References

IEEE Distributed Systems Online http://dsonline.computer.org/
  contains 14 topic areas with introductory and research information.

ACM Symposia on Operating Systems Principles '79, 81, .. the most recent was SOSP20
  The source for reports on many research projects
  The proceedings are special issues of ACM Operating Systems Review.

IEEE ICDCS and its workshops have papers on a broad range of DS topics.

Jean Bacon and Tim Harris "Operating Systems, Concurrent and distributed Software Design"
  Addison Wesley 2003, Ch 6, 7, 8, 16, 22, 23, 28, 29

Jean Bacon "Concurrent Systems" Addison Wesley 1998(ED2) Ch 5, 7, 15, 21, 22, 26

A Tanenbaum and M van Steen "Distributed Systems, Principles and Paradigms"
  Prentice Hall 2002, For general background reading

Coulouris G, Dollimore J and Kindberg T
  " Distributed Systems, Concepts and Design" Addison Wesley, ED3, 2001
  For general background reading

Lamport L, "Time, clocks and the ordering of events in a Distributed System"
  Comm ACM 21(7) 558 - 565 July 78

Mullender S (ed), "Distributed Systems"
  Addison Wesley, ACM Press, ED2 1993
  For general background reading

Distributed Systems research at Cambridge
  Browse the web pages starting from Research/SRG for information on current grants,
  recent publications, RA posts etc.
http://www.research.microsoft.com/NeedhamBook/cmds is the (out-of-print) book
  by Roger Needham and Andrew Herbert on the Cambridge Distributed Computing System.

 Two short overview papers on recent Opera group research:
Bacon, Moody, Bates, Hayton, Ma, McNeil, Seidel, Spiteri
  Generic Support for Distributed Applications
  IEEE Computer, pp 68-76, March 2000

Jean Bacon and Ken Moody, "Towards open, secure, widely distributed services"
  Communications of the ACM, pp.59-63, June 2002

Distributed Systems:Study Guide

Desirable prerequisites:
Concurrent Systems and Applications, Operating Systems, Digital Communications, Security

For background reading browse the references, but note that books entirely devoted to DS
will have too much detail for an 8 lecture course.
The approach taken in the course can be found in parts of
Concurrent Systems ED2 (Jean Bacon)
Operating Systems   (Jean Bacon and Tim Harris)

	CS	OS	
Ch	5	7	DS fundamentals (overview, time, naming)
Ch	7	6	sections on distributed filing systems
Ch	15	16	Distributed IPC, RPC
Ch	21	22	Distributed transactions
Ch	22	23	Distributed algorithms
Ch		28	Web services
Ch	26	29	Middleware (ED2 Ch 26 is now very dated)

Past exam questions are probably the best revision exercises, although the course has evolved
over the years. There are also exercises at the end of most chapters of CS and OS
with solutions in the web-browsable Instructors' Guide. This is accessible via the course
materials page. It is intended for teachers and outside Cambridge is password-protected.
Please respect this.

The notes start with the most important OHP foil - fundamental properties of DS.
Keep these in mind for all the topics.
It's relatively easy to devise algorithms and protocols, or formalise systems,
if you abstract out failures and ignore uncertainty over time.

You can find information on current DS research projects in the Lab by browsing the
Systems Research Group pages, NetOS and Opera.

Peter Pietzuch gave the lecture on Middleware when I was away last year. I have kept
his notes and have also put in (for browsing only), from my previous notes, more detail
on RPC systems' operation (which part 2 have covered and 2G/Dip probably haven't).