

DISTRIBUTED SYSTEMS

FUNDAMENTAL PROPERTIES

1. concurrent execution of components
2. independent failure modes
components and connections may fail independently
3. transmission delay
4. relativistic time

IMPLICATIONS

2. -> cannot know why there's no reply - failure or congestion
a heartbeat infrastructure can be useful
4. -> cannot use local timestamps from different places
to order the occurrence of events, *see T1 - T12*

1 and 3 -> inconsistent state *see D1 - D20*
replicas of a single object
related changes to different objects

1 -> can't wait for quiescence to resolve inconsistencies, but must achieve consistency

Time and event ordering T1-26 and Distributed algorithms D1-20

exam questions still OK
these sections are on fundamental concepts

Middleware M1 - 29

exam questions can become dated
e.g. early emphasis on RPC then CORBA
e.g. web services becoming important, build on html and xml from about 2000
e.g. convergence of asynchronous middlewares
message (JMS + MQ),
1990s: events for environmental monitoring, pub/sub for Tibco/Reuter global newsfeeds etc
2000s pub/sub terminology used for both

Naming N1-22

exam questions still OK
new challenges are mobility and scale of ubiquitous computing

Access Control (Authorisation) A1-22

exam questions still OK
RBAC is more generally accepted for achieving scalability than ten years ago

Storage S1 - 14

the topic is migrating into OS courses - network-based file servers
CFS is of historical interest

Recently added notes - as opposed to incremental evolution of topics - so not in past exam papers

Domain structured, large-scale systems

not covered explicitly before, although touched on in OASIS RBAC

Event-based middleware - case study

EBM now generally accepted as important for ubiquitous computing
- how to integrate it with other parts of systems?

Note that questions need not be just "bookwork" and can ask you to relate the various parts of the course
e.g. storage and access control
e.g. naming and middleware

Read the questions carefully and answer them fully. Missing parts are the main cause of loss of marks when you know the subject well.
Don't waste time note-dumping - there are marks only for what the question asks for.

I prefer structured text to continuous prose e.g. bullet points - with enough explanation
If in doubt ASK - e.g. ambiguity in question the setter and examiners may not have noticed.
e.g. 1998: "alternative approaches to creating unique names in DS"
Or write down how you are interpreting the question.
I give credit if there's a genuine mis-reading.

PhD funding available

EPSRC SmartFlow grant PhD studentship

Control of storage and communication of cancer records

- dynamically during treatment(s)
- historically for population studies

policy expression and enforcement,
conflict detection and resolution,
formal modelling (fluent calculus),
anonymisation while retaining info' for studies
 involving family relationships, geography, pollution exposure etc.

EPSRC/BT CASE PhD studentship

Policy-based approach for privacy and security in Information networks

policy expression and enforcement, considering: info owners, info consumers, anti-terrorism,
law enforcement agencies, FOI champions, infrastructure operators
context-sensitive decision-making and enforcement,
conflicts of interest in context, e.g. collective security vs individual liberty
formal modelling, conflict detection and resolution,