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

replicas of a single object
related changes to different objects

1 -> can’t wait for quiescence to resolve inconsistencies

see D1 - D20
**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. web services becoming important
e.g. convergence of asynchronous middlewares
  *message, events, publish/subscribe*

**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
New 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.

I prefer structured text to continuous prose e.g. bullet points - with enough explanation
If in doubt ASK - e.g. ambiguity in question.
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.