Middleware


Timeline

- CORBA 1.0, 1991
- Various protocol standards, e.g. RFC 1057 (1988)
- Birrell & Nelson, Implementing Remote Procedure Calls, 1984
- Nelson, Remote Procedure Call, 1981
- RPC first discussed: 1976 or earlier
Remote Procedure Call

\[ x = \text{foo}(y); \]

Implementing Remote Procedure Calls (Birrell & Nelson, 1984)

- Real world problem: Distributed systems are Hard.
  - In Xerox PARC community: only experts undertake it.
  - Some difficulties are fundamental (timing, failures, coexistence of environments) but others are not.
- Research problem: RPC that local people will use.
  - Must be efficient. Try providing security too.
- Experiment: Examine design choices. Build.
- Result: Used in local projects at time of writing.
- Impact: Sure gets cited a lot.
  - As carrier of “This is RPC”... but also “reducing cost of RPC”
Implementing Remote Procedure Calls

◆ Problem type: Method/Improvement.
  ■ What is a better way to do X?
◆ Research model:
  ■ Examine and document design choices.
◆ Hypothesis:
  ■ Can make distributed computing easier - while still efficient enough (“factor of 5”) for people to actually use
◆ Strategy:
  ■ Implement with optimizations. Measure.
◆ Validation:
  ■ “factor of 5”? Sometimes. And people were using it.