Software Architecture for Mobile Computing

References:

- M. Satyanarayanan, Fundamental Challenges in Mobile Computing
- Evanggelia Pitoura, George Samaras, *Data Management for Mobile Computing*, Kluwer Academic Publishers, to be published.
- Andrew S. Tanenbaum, *Modern Operating Systems*, Chap 13, Prentice Hall, 1992

Four Characteristic Constraints due to Mobility:

1. Mobile elements are resource-poor relative to static elements.
2. Mobility is inherently hazardous.
3. Mobile connectivity is highly variable in performance and reliability.
4. Mobile elements rely on a finite energy source. Concern for power consumption must span many levels of hardware and software to be effective.

Mobile computing models

- The Client-Server Model
- The Client-Agent-Server Model
- The Client-Intercept-Server Model (The Extended Client-Server Model)
- Peer-to-Peer Models
- Mobile Agent Models

Environmental Awareness

The Need for Adaptation:

- tradeoff (tension) between autonomy and interdependence
- reliance to static server vs self-reliance
- need to be adaptive

Taxonomy of Adaptation Strategies (Fig 1):

- No system support – difficult to write application
- No changes to application – Application-transparent
- in between, many possibilities in application-aware adaptation – support a collaborative partnership between applications and the system.

Types of agents that support mobility (Table 2.1, p. 27)

Issues in Distributed File Systems

- Semantics of file sharing (Fig 13-4, Fig 13-5)
- Stateless versus stateful servers (Fig 13-8)
- Caching – where to store files (Fig 13-9)
- Cache consistency (Fig 13-11)
- Replication (Fig 13-12)

Summary of Coda and Odyssey Results

- disconnected operation
- optimistic application
- support for weak connectivity
- isolation-only transactions
- server replication

Fertile Topics for Exploration:

1. Caching metrics
2. Semantics of callbacks and validators
3. Algorithms for resource revocation
4. Analysis of adaptation
5. Global estimation from local observations