Rover Technology Implementation of a Scalable Context-Aware Computing System

Rover enables the automatic access to information and services based on the location, the current time, and user interests. A Museum Scenario **Location Determination using Joint Clustering Rover Architecture**

- Users: tourists at the museum
- Devices: off-the shelf handhelds
- Access Infrastructure: wireless - 802.11 WLAN, Bluetooth, Cellular, IrDA
- Example functionality
 - Automatic tailoring of information • Audio/video streaming on exhibits
 - Directional services
 - Map routes for museum tour
 - Emergency services
 - Locate the nearest fire exit in the West Wing
 - Group Coordination
 - Locate missing members when bus is about to leave

Rover Services

- Basic data services
 - Text, audio, video delivery
 - Location-specific: e.g. find restaurants within 5 miles
 - Map-based
 - **Time-specific**: e.g. alerts and notifications
 - **Device-specific**: e.g. high-resolution display
 - User-specific: e.g. info on art exhibits only
- Transactional services
 - E-commerce applications

Action Model for Rover Controller

A new concurrent software architecture

- Provides lightweight fine-resolution application-specific scheduling
- Achieves high resource utilization



Comparison of execution time overheads (in ms)			
Scenario	System	Action-based	Thread-based
10000 Server Operations A	M1:Pentium/Linux	24.27	299.36
10000 Server Operations A	M2: Sparc/ Solaris	62.82	1000.9
100 Server Operations B	M1: Controller, M2: Database	11.61	728.30



mall of the University of Maryland campus. (a) Rover client running the client software showing the mall map. (b) A notification to the client about a nearby food stall. The user associated with the client had previously set a trigger notification request when he is close to a food stall

users.





Physical Architecture of A Multi-Rover System



Logical Architecture of Rover Controller

Rover Demo









- Run server and database on a machine
- Pentium IV 1.5 GHz desktop
- S Run client loader on another machine
- Pentium III 800 MHz laptop
- S Collect response time statistics at different points (database, server and client) S Collect statistics for individual operations
- S Vary think time and number of clients and observe response time behavior

Experimental Results

- $S N^* = 1 + Z / D$
- sif Z = 200 ms

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