The Proximal Workspace Architecture: A Latency-focused Approach to Supporting Context-Aware Applications

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• Background and Motivation
  • Small Devices
  • Big Applications
  • Thin Clients
• System Architecture
• Adaptation of Google Earth
• Next Steps
Small Devices

Zypad Wearable

iPhone

Netbook

Nanotech

Contact Lens Display (UW)
Big Applications

Virtual Worlds  Maps  Augmented Reality

• Data/Computation Intensive, Context Dependent
Google Earth 3D
Ancient Rome

- Interactively explore ancient Roman buildings
Application Characteristics

- Data Intensive
- Computation Intensive
- Sensor data
- Frequent user-interaction
- Poor native performance on client
• Background and Motivation

• **System Architecture**
  • Terminals
  • World
  • Architecture

• Adaptation of Applications

• Completed Work

• Next Steps
Terminals

- A collection of input/output devices and sensors
• Various servers scattered over the internet.
Architecture

- Low latency: GPS, video, earpiece, PDA, terminals
- High latency: work space
- High latency: web server, user’s server, game server, web server
- World
The Purpose of the Workspace

- Mediates between world and client, adjusting for performance
- Quick communication with the client
- Dependence on physical location runs
- Add additional functionality to programs
- Create mash-ups between multiple programs
• Background and Motivation
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Data Model

![Diagram showing data model with
- terminals
- workspace
- internet
- Google server
connections via wi-fi]
Google Earth: Unmodified
Google Earth

- video glasses
- 3D navigator
- netbook
- terminals
- display forwarder
- GE app
- sensor interpreter
- workspace
- Google server
- world
Next Steps

- Focus on I/O issues
I/O Devices

- camera
- microphone
- mouse
- accelerometer
- GPS
- temperature sensor
- light sensor
- RFID
- barcode reader
- keyboard
- biometric sensors
- touch sensor
- sound card
- video card
I/O

device → application

3 ms

device → application

1 ms
functions

- Caching
- Polling
- Buffering
- Encrypting
- Compressing
- Synchronizing Multiple Datastreams

- Transforming
  - Adding Timestamps
  - Averaging
  - Discarding Non-Recent Updates
  - Predicting Future Updates