RESOURCE OPTIMIZATION
BY
ADAPTIVE MONITORING

Larry Rudolph
CSAIL MIT
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Track location based on bluetooth beacons

Easy: just put BT dongles in PC’s, right?

Wrong: install often hard; dongles disappear

Easy: just use location as dongle name, right?

Wrong: fast to find BT-id, slow to get name
ADAPTIVE LISTENING
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- What is best inquiry frequency?
  - Too often, expensive: Costs energy for phone to issue BT inquiry
  - Too rare, miss beacons
  - Same issue when phone access BT GPS receiver
  - Some idea when next turn should occur
ADAPTIVE PROBING

- Lots of stuff interacting
- Dynamic
- What if a device acts strange?
Adaptive Probing

Each component monitors its health
App. spec monitor probes components
How frequently?
CONFERENCE ASSISTANT

- Static content + generated content
- Alice generates on various devices
- Alice shares some content with others
When and how to move content between Alice’s devices?

Shared content vs. replicated private content -- how much, where, when?
NEED THEORY; STRATEGY

- To make best use of resources
- Adapt to situation
- Need way to decide what to do and when
SKIS: RENT OR BUY?

- Amortized Cost Analysis, skiing example:
  - $50 to rent; $500 to buy
  - after spending $500 renting, then buy
  - no knowledge of future $\leq 2 \times$ optimal
  - Keep track of expenditures & savings
Example: Checkpointing

- Programmer knows where to put them
- System knows if it is worth doing them

\[
\text{(Amount of work lost) } \times \text{ (probability of crash)} \quad \text{vs} \quad \text{(Overhead) } \times \text{ (probability of no crash)}
\]
Speech Recognition

- Ambiguous mapping from wave to phonemes
- Ambiguous mapping from phonemes to words
- Ambiguous mapping from words to sentences
- Carry along the ambiguity but reducing it at each level
TOUCH SCREEN FAULTS

- Common buttons should be large
- Visually unpleasing
- Increase touched area and weigh overlap by frequency
UNIFICATION OF UI?

Graphical UI
Speech UI
Sketch UI
Visual UI

Expectations (Domains)
Universal User Interface
Engine
Confidence (N-Best)

• Impacts several layers: OS, Language, Runtime
CONCLUSION

• Adaptive schemes can reduce resources
  • human time, errors, power, memory
• Often need off-line and on-line knowledge
• Need some guiding theory
• Widely applicable, especially in new domains