Resource Optimization by Adaptive Monitoring

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Adaptive Listening

- 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

Adaptive Listening

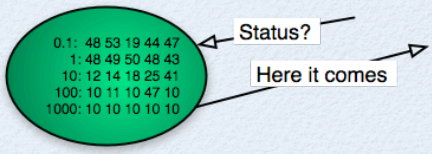
- What is best inquiry frequency?
  - Too often, expensive: Costs energy for phone to issue BT inquiry
  - Too rare, miss beacons
- Same issue when phone access BT GPS receiver
  - Some idea when next turn should occur

ADAPTIVE PROBING

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

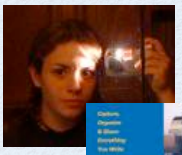
ADAPTIVE PROBING

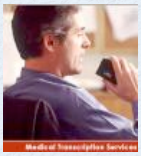
- Each component monitors its health
- App. spec monitor probes components
- How frequently?



CONFERENCE ASSISTANT

- Static content + generated content
- Alice generates on various devices
- Alice shares some content with others

CONFERENCE ASSISTANT

- When and how to move content between Alice's devices?
- Shared content vs. replicated private content -- how much, where, when?

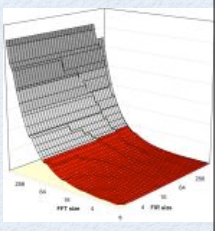


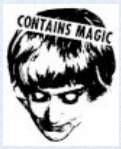


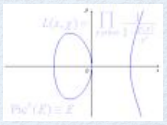



Need theory; strategy

- To make best use of resources
  - adapt to situation
  - need way to decide what to do and when







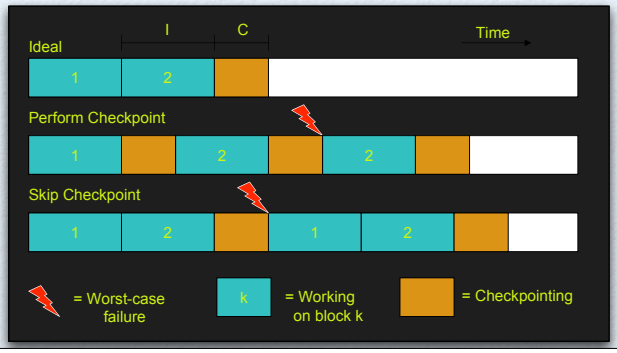
Skis: rent or buy?

- Amortized Cost Analysis, skiing example:
  - $50 to rent; $500 to buy
  - after spending $500 renting, then buy
  - no knowledge of future <= 2 * optimal
- Keep track of expenditures & savings

Risk Based Computation

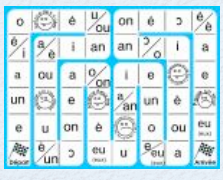
- Example: Checkpointing
  - Programmer knows where to put them
  - System knows if it is worth doing them

(Amount of work lost) * (probability of crash)
vs
(Overhead) * (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

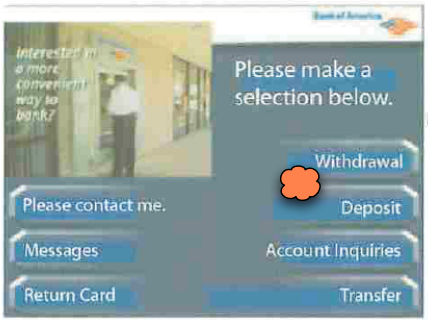


Figure 3-1: A typical ATM screen

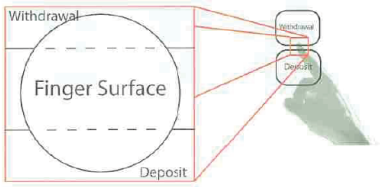
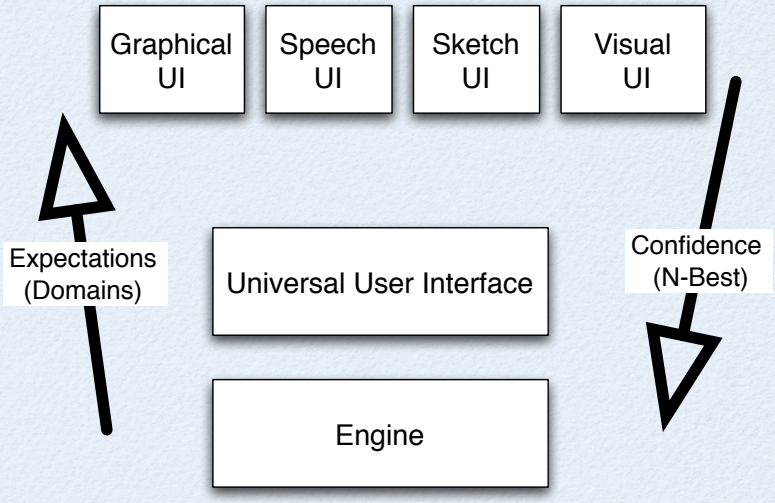


Figure 3-3: An Instance of an Ambiguous Touchscreen Selection

UNIFICATION OF UI?



- 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