vTube: Efficient Streaming of Virtual Appliances Over Last-Mile Networks
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VA STREAMING

- Stream VAs just like videos
- Easy and instant access
- Over Wi-Fi, 4G/3G etc.
- VAs are richer than videos
- Computation and data
- Enable new use cases

vTube DESIGN

- Server with VA repository
- Client VMM with streaming support
- VA streaming algorithm
- Applies video streaming paradigm
- Buffers while VM is paused
- Streams while VM is executed

DRIVING USE CASES

- User with huge local media contents
- Looking for good editing software
- Needs agility, interactivity, efficiency

CHALLENGES

- VM is non-deterministic
- Depends on workload
- State accesses are bursty
- Hard to predict timings
- Misses impact usability
- Need accurate streaming

STREAMING ALGORITHM

1. Process traces to extract access patterns
   - Derive “clusters,” components of
2. Control VM state transfer and execution
   - Buffer/stream based on access demands
   - Buffer when demand is too high

EXPERIMENTS

- Streaming over real networks
  - Game “Riven” on Windows 7

- Application-level performance
  - Video playback (MPlayer)
  - HTML document browsing (Firefox+Selenium)

- Numbers at a glance
  - 7 VAs for media editing, games etc.
  - Span Ubuntu and Windows XP/7
  - Accessed state: 76 - 379 MB
  - State transfer overhead: ≤ 51%

SUMMARY

- vTube achieves VA streaming with:
  - Agility, interactivity, efficiency
  - Efficient streaming algorithm
  - Applies video streaming paradigm
  - Uses fine-grained analysis of traces
  - Demonstrated good usability
  - Swift VM launch
  - Execution with minimal disruption
  - Over Wi-Fi and 4G/3G connections