STORYBOARDS
VISUAL DEVELOPMENT
WEATHER
VARIANCE
CHARACTER
SCALE
BARK EROSION
ROOT DECAY
TOP VIEW
BACK VIEW
ROCK TYPE
CHARACTER SCALE
VIEW
RIGGING
ENVIRONMENTAL FX
LIGHTING
IN ONE FILM

600 terabytes of data
20,000 cores
120,000,000 CPU hours
500,000,000 files
250,000,000,000 pixels
The world knows us as a creator of quality family entertainment, in actuality... DREAMWORKS ANIMATION is DIGITAL MANUFACTURER creating digital product that is distributed and consumed worldwide.
Why Remote Persistent Memory?

- Many small items in a large working set
- Substantial re-use and repeat file I/O
- Expensive to compute and convert
- Persist in a directly consumable layout
- Distributed clients doing similar things
- Writes are immutable; lockless updates
PMEM in Artist Workstations?

- NVDIMMs in each workstation and server
- Accelerate local workflows
- A stranded resource / adds state
- Federate & share? What about protection?
- East/West traffic and RDMA capable NICs
Our Studio’s Vision

- Cluster of Persistent Memory servers
- Software stack that provides RPM-as-a-Service
- Via RDMA over Ethernet; fallback to TCP
- A way for apps to persist things
- A way for apps to find and get things
- That behaves like named shared memory
Additional Goals

• User space / minimal (zero?) copies
• Reduce trips through the storage stack
• Reduce de-serialization / re-serialization
• Faster iteration on a larger working set
• Dynamic Compute Framework attach/detach
Points to Ponder

• Client API and client memory layout
• A Namespace with versioning
• Workflows for publish and invalidation
• Multi-tenant isolation
• BC/DR protection and production restart