Reining in Research Data

Adding Structure to Unstructured Data

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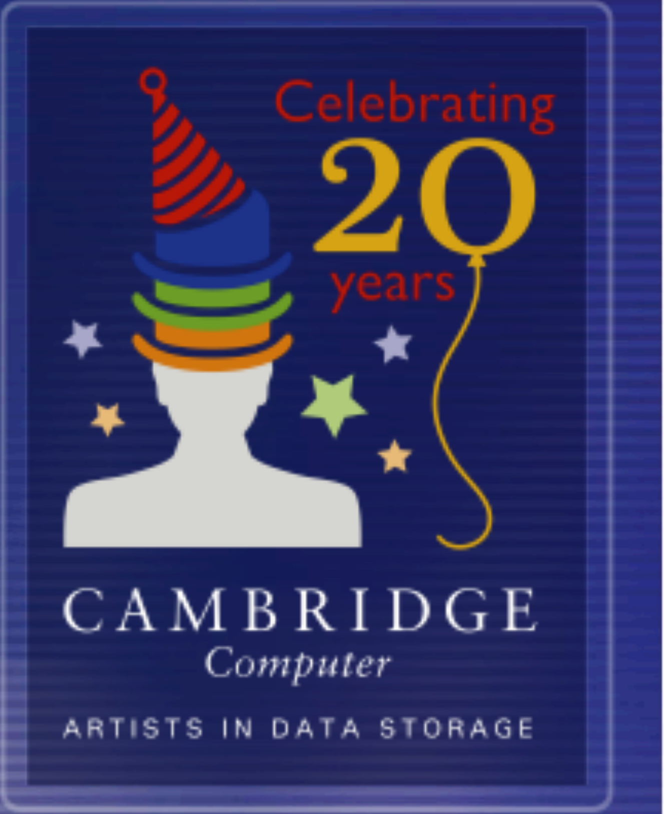
A Little Background On Cambridge Computer

- Founded in 1991 as a boutique integrator for backup and archive solutions
- Approximately 75 employees nationwide
- Clients of all shapes and sizes across all industries
  - Particularly strong in research and higher ed
- Industry-wide reputation for:
  - defining best practices for enterprise class data protection, and
  - for the early adoption of next generation storage solutions
- A unique business model that allows us to straddle the fence between academia and industry



Our Project – Defining Best Practices for File Management

- Inspiration for our project comes from SRB/IRODS
  - Bring parts of the SRB/IRODS vision to reality
    - Define a general purpose feature set
    - Intuitive user interface
    - Simplified API
- Inspiration also comes from numerous home grown solutions in our client base.
- What we have built
  - A prototype application that our clients can use to understand how they can take advantage of smarter file storage management.
  - A way of illustrating concepts to people who otherwise don't get it and don't want to invest the mental energy to figure out what we have all been talking about!
  - A file system reporting tool that can interact with the users themselves

Long Term High Level Goals

- Provide superior storage management housekeeping throughout the data life cycle
  - Backups, data integrity verification, storage tiering, disposition
- Facilitate the hand off between live research and preservation
  - Prime the pump with metadata that has been gathered throughout data life cycle
  - Provide a persistent file address for digital asset management systems, regardless of where the files are physically stored.
- Provide the framework for chargebacks and cost accounting.
- Enable scientist to better organize, share, and collaborate
  - Provide the framework for fulfilling data management plans

The Meaning of Words

- The word “archive” means different things to different people
  - Records management / retention
  - Immutability (WORM)
  - Migration of data to offline or near-line media
    - General belief is that files are now out of reach
  - Digital preservation
- The storage industry favors the term “*life cycle management*” which can mean all of these things.
  - This, of course, creates a different kind of confusion!

Challenges Specific To Managing Research Data

- There is a lot of data!
  - Hard to move, expensive to store, etc.
- The researchers work the way the want to work
  - Hard to get them to change behaviors without big carrots and big sticks
  - No matter what you try, some (many) will not comply
- Performance / latency concerns
  - We cannot introduce a performance hit
- Data formats become obsolete quickly
- Uncertainty over what to keep versus what to throw away
- Data accessibility v. privacy
  - The granting agencies want data to be shared
  - Researchers are afraid of getting “scooped”
  - HIPAA concerns, human subject data, etc.

Metadata – Competing Interests

- Lots of people want metadata, but no one really wants to type it in!
  - Preservation systems will have to co-exist with the research group's own wants and needs
    - Research groups have their own idea of what metadata they want and how they want to use it
    - Storage administrators need certain metadata
    - Project managers and grant administrators need certain metadata
- Archival systems need to be interactive with live data
  - Preservation is a component of complete storage management.
  - Provenance – The metadata must have a way of keeping track of how archived data is used in future research.

The Real Trick – Getting the Metadata

- The Golden Rule of Data Preservation – "Preserve at the time of creation"
  - Translation: Capture metadata throughout the research pipeline
- Perhaps capture metadata when storage is provisioned
  - The presumes that there is a structured process for provisioning storage
- Capture metadata through an API
  - This requires a simple API that anyone can use
- Programmatically extract metadata from file headers, tags, and content
- Capture metadata through a GUI
  - Try to create incentives for users to key in metadata

The Mwah Hah Hah Plan to Conquer the World

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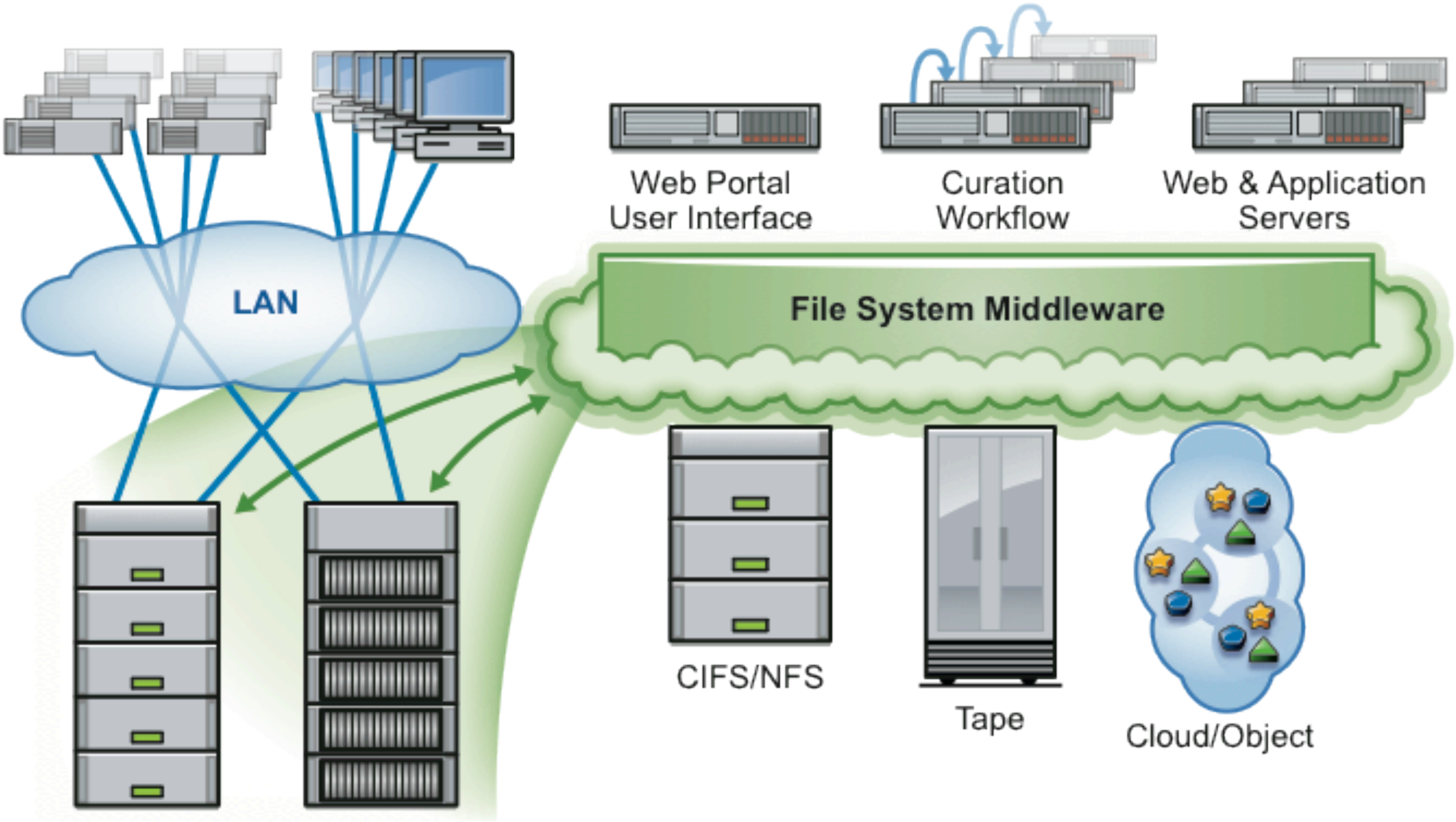
ARTISTS IN DATA STORAGE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