Dr. Andrew Grimshaw, CTO and Founder
Avaki Corporation

> Improving Multi-site/Multi-departmental Cluster Systems Through Data Grids in the Automotive and Aerospace Industries
Avaki Data Grid™ software enables wide-area data sharing critical to collaborative product development and production in Aerospace and Automotive manufacturing

For Product Developers and Production, Avaki Data Grid:

> Enables secure wide-area sharing of consistent, current product design data to improve information sharing and shorten product cycles

For IT, Avaki Data Grid:

> Delivers breakthrough reductions in infrastructure complexity and cost, while complementing existing solutions
Avaki Company Background

- Founded in 2001 – 10 years of R&D at University of Virginia
- Award winning software for data access and integration, powered by grid
- Focus on R&D-intensive industries

<table>
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<tr>
<th>Customers</th>
<th>Partners</th>
<th>Awards</th>
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| Pfizer, IBM, Aventis, Sun Microsystems, Texas Tech University, BioGrid, Structural Bioinformatics, Inc. | IBM, hp, Sun Microsystems, Infinity Pharmaceuticals, Gene Logic | “Top 10 Start-ups to Watch”
| | | Bio-IT World “Best of Show”
| | | “Top 10 Vendors to Watch”

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Agenda

> The Wide-Area Data Sharing Challenge in Manufacturing and Current Approaches
> Avaki Data Grid™
> Summary and Wrap-up
The Data Challenge in Product Development

- **R&D and production must share data in complex environments**
  - Product designers distributed geographically
    - Many sites and partners, heterogeneous systems, prone infrastructure
  - Deadline pressure to develop new products
  - Mergers and acquisitions

- **Traditional data sharing approaches are limited**
  - No location transparency
  - No access transparency (NFS vs. FTP vs. HTTP, username/password)
  - Not wide-area (e.g., NFS, NAS)
  - Insecure (e.g., FTP)
  - Inconsistency among replicas (e.g., SSH/SCP)
  - Obtrusive (AFS, Kerberos)

- **... Leading to difficulty and expense because**
  - Collaborators ramp up too slowly
  - Product cycles lengthen
  - Infrastructure and administration becomes costly
Wide-area Data Access Challenges – Provisioning Data to Compute Farm

Data Access Needs:
- Transparent
- Current, consistent data
- Secure
- Scalable
- Heterogeneous

Company Remote Office

Current Approaches:
- FTP
- DMZ
- VPN
- Replication

Company Headquarters

Partner Company
Wide-area Data Access Challenges –
Multisite Sharing & Collaboration (Internal)

Data Access Needs:
- Transparent
- Current, consistent data
- Secure
- Scalable
- Heterogeneous

Current Approaches:
- FTP
- DMZ
- VPN
- Replication

Company Headquarters

Company Remote Office

Partner Company

?
Wide-area Data Access Challenges – Partner Collaboration

Data Access Needs:
- Transparent
- Current, consistent data
- Secure
- Scalable
- Heterogeneous

Company Remote Office

Current Approaches:
- FTP
- DMZ
- VPN
- Replication

Company Headquarters

Partner Company
Data Access Needs:
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Current Approaches:
- FTP
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- Replication

Wide-area Data Access Challenges – Merger/Acquisition Integration
NFS Limitations

- **Not wide-area – LAN protocol**
  - too aggressive cache flush
  - too small default read blocks
  - request-reply protocol
  - stateless

- **Insecure**
  - unencrypted data stream
  - server trusts clients
  - no thru-firewall transmission

- **Complex administration**
  - identical user name spaces
  - cross-mounts
  - poor scalability
“15-20% of R&D time is spent looking for the right data or tools.”
“40% of the time, work has to be redone because of data or tool inconsistencies.”

- **Insecure**
  - unencrypted data
  - no thru-firewall transmission

- **Inconsistent, out-of-date copies**
  - all-or-nothing copies
  - manual, error-prone

- **Complex administration**
  - anonymous ftp
  - remote user accounts

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Data Replication Limitations

- Data inconsistency & rework
- Requires expensive storage (NAS filers)
- Consumes network bandwidth
- Significant administration and maintenance
Virtual Private Network (VPN) and Demilitarized Zone (DMZ) Limitations

**VPN**
- Opens entire network to partners
- Requires remote user accounts
- High administrative cost

**DMZ**
- Out-of-sync data (FTP)
- Requires separate DMZ for each partner
- Hard to administer

[Diagram showing connections between Company Headquarters, Company Remote Office, Partner Company, and DMZ.]
Agenda

> The Wide-Area Data Sharing Challenge in Manufacturing and Current Approaches
> Avaki Data Grid™
> Summary and Wrap-up
**Solution Summary:**
- Federated view of data and processing resources
- Fine-grained security, wide area access
- Resource owners retain control
- Consistent, current data
- Caching for performance
- Easy deployment & admin

**Avaki “Grid Tone”:**
- Global Namespace
- User Identity & Authentication
- Resource Discovery & Monitoring
- Mgmt Policy
- Access control
- Encryption
Avaki Product & Services

Avaki Enterprise Software

Avaki Data Grid
- Single, uniform environment providing wide-area access to consistent, current data
- Federates data, federates access control, provides remote data caching

Avaki Compute Grid
- Secure, wide-area access to computing
- Integrates existing clustering, queuing & scheduling technologies into one seamless compute fabric

Avaki Comprehensive Grid
- Combines ADG and ACG for wide are access to compute and data
- Improve IT resource utilization, allows cross-company resource rationalization.

Avaki Services
- For our software customers, full pre-sale, installation, deployment, support and consulting services
A single system for sharing data across many systems, locations, users

> Unified view of all distributed data
  - Access data as if it were local
  - Location, access transparency
  - Low “activation energy” - unobtrusive technology

> Secure access
  - Granular access control
  - Integrates with existing authentication services (NIS, LDAP)

> Local control - Site autonomy
  - Data remains on local system (one copy)
  - Security administered locally by data owner

> Automatic data caching

> Complements existing PLM/PDM and SCM solutions
When Product Developers Share Data into the Grid, They…

- Create a link to an existing data source, not a replica
- Set access controls
- Set encryption options
- Build the unified grid directory structure
When Product Developers Access Data on the Grid, They…

> See a unified view of data

> Access data as if it were local

> Can search across the grid

> See only data to which they have access

> Use NFS, Web, existing systems
When IT Configures and Administers the Grid, They…

> Install Avaki software components – without changing infrastructure

> Use a simple web interface to configure

> Establish one unified set of users and groups

> Monitor grid activity and availability

> Define connections between grids – local control
A *Share* is created when a file system directory is ‘shared’ into the grid directory.

The directory structure of the file system being shared is reflected in the grid directory.

Access control & level of encryption is set when the share is created.

Every grid object has the following permissions:

- r – read
- w – write
- x - execute
- d – delete
- o – owner
The administrator defines users and groups:

- Registers individuals and groups
- Imports from an external directory service such as LDAP, NIS, and Active Directory
Accessing Data in the Grid: The Avaki “Data Grid Access Server”

Users & applications access grid files they have permission for as if they are local via:
• NFS
• CIFS

Access control rights are checked on all file operations
Agenda

> The Wide-Area Data Sharing Challenge in Manufacturing and Current Approaches
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### Key Features

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<thead>
<tr>
<th>Unified data view</th>
<th>Single, logical view, regardless of data location or type</th>
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<tr>
<td>Federated data access</td>
<td>Cross-company data access</td>
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<tr>
<td>Federated access control</td>
<td>Owners manage access to their resources</td>
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<tr>
<td>Remote data caching</td>
<td>Fast performance in wide-area settings</td>
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<tr>
<td>Standards-based</td>
<td>Easily deployed and integrated into existing IT</td>
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<tr>
<td>High availability, failover</td>
<td>More reliable infrastructure; more productive users</td>
</tr>
<tr>
<td>Scalable architecture</td>
<td>Grows to meet your expanding needs</td>
</tr>
<tr>
<td>Web UI, monitoring, search</td>
<td>Easy for users and administrators</td>
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<tr>
<td>Grid-to-Grid connectivity</td>
<td>Cross-company partnering with secure, local control</td>
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Avaki Data Grid: The Business Impact

- Add new R&D and trading partners quickly
- Control IT costs
  - Deploy rapidly on existing infrastructure
  - Reduce administrative overhead
- Complement & extend existing PLM/PDM & SCM solutions
- Protect intellectual property
- Shorten product cycles
> Avaki’s Data Grid solution
  – Data Access and Integration

> Hewlett-Packard
  – HP with Avaki delivers complete manufacturing solutions for product development chain
  – Professional service expertise in product design, engineering and production solutions
  – High performance systems and storage for R&D
To Learn More…

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Web: www.avaki.com
Call: 781.272.3331 x 2220