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Jiro Technology-Based Management Logic Applications

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Introducing the Developers

- **Guy Bunker**
  Corporate Architecture Team
  VERITAS
- **Michael Kearney**
  Chief Software Architect
  CreekPath Systems
- **Paul Monday**
  Senior Staff Software Engineer
  Imation
- **Bently Preece**
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  Ancor Communications, Inc.
- **Roger Stager**
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  Legato
- **Peter Tran**
  Software Engineer
  Gadzoox

Introducing the Developers

- **Terry Braun**
  Mike Harviala
  Veritas
- **Michael Kearney**
  Chief Software Architect
  CreekPath Systems
- **Bob Searfus**
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- **Erwin Rehme**
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- **Curt Brobst**
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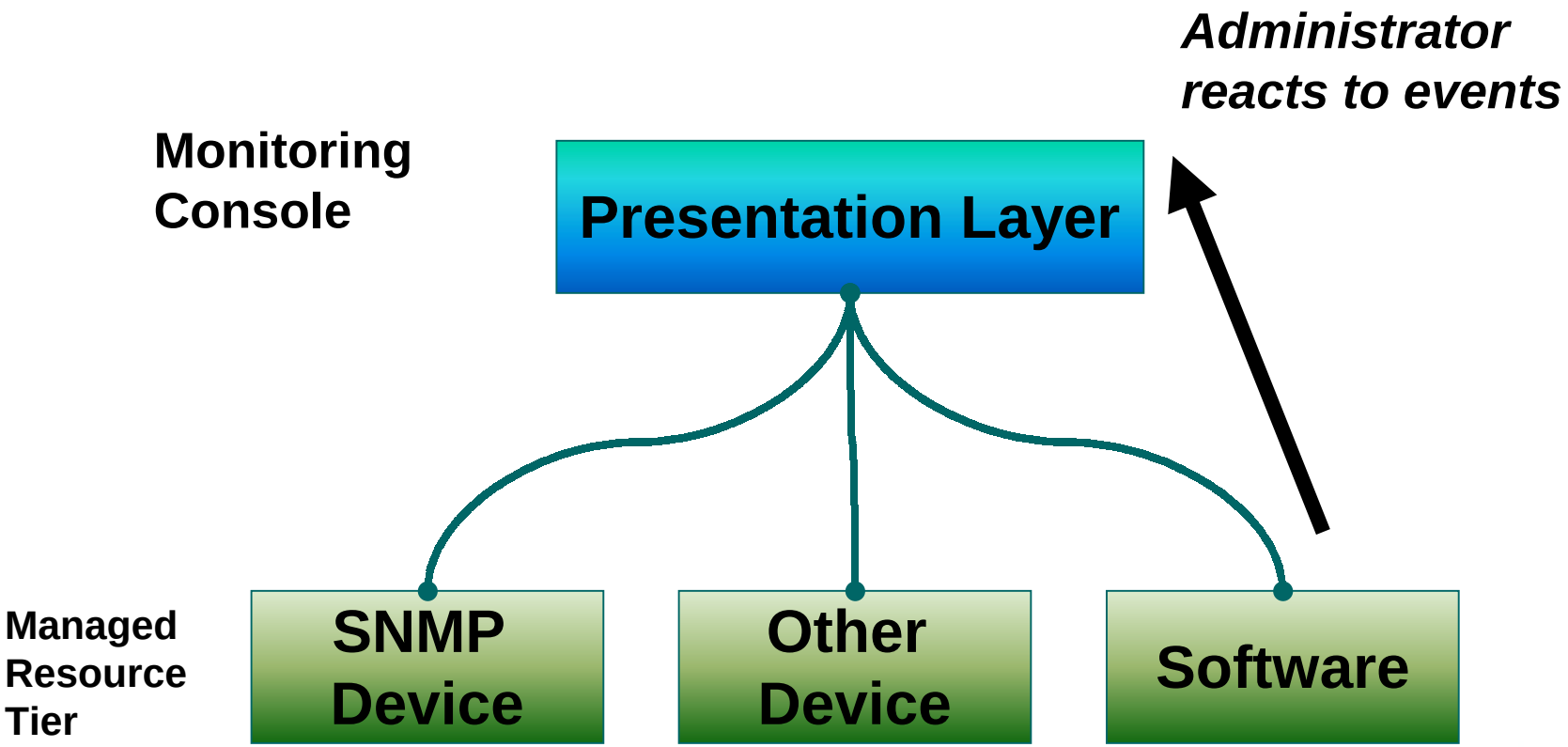
- **Jeff Ryan**
  Imation
- **Steve Halter**
  Imation

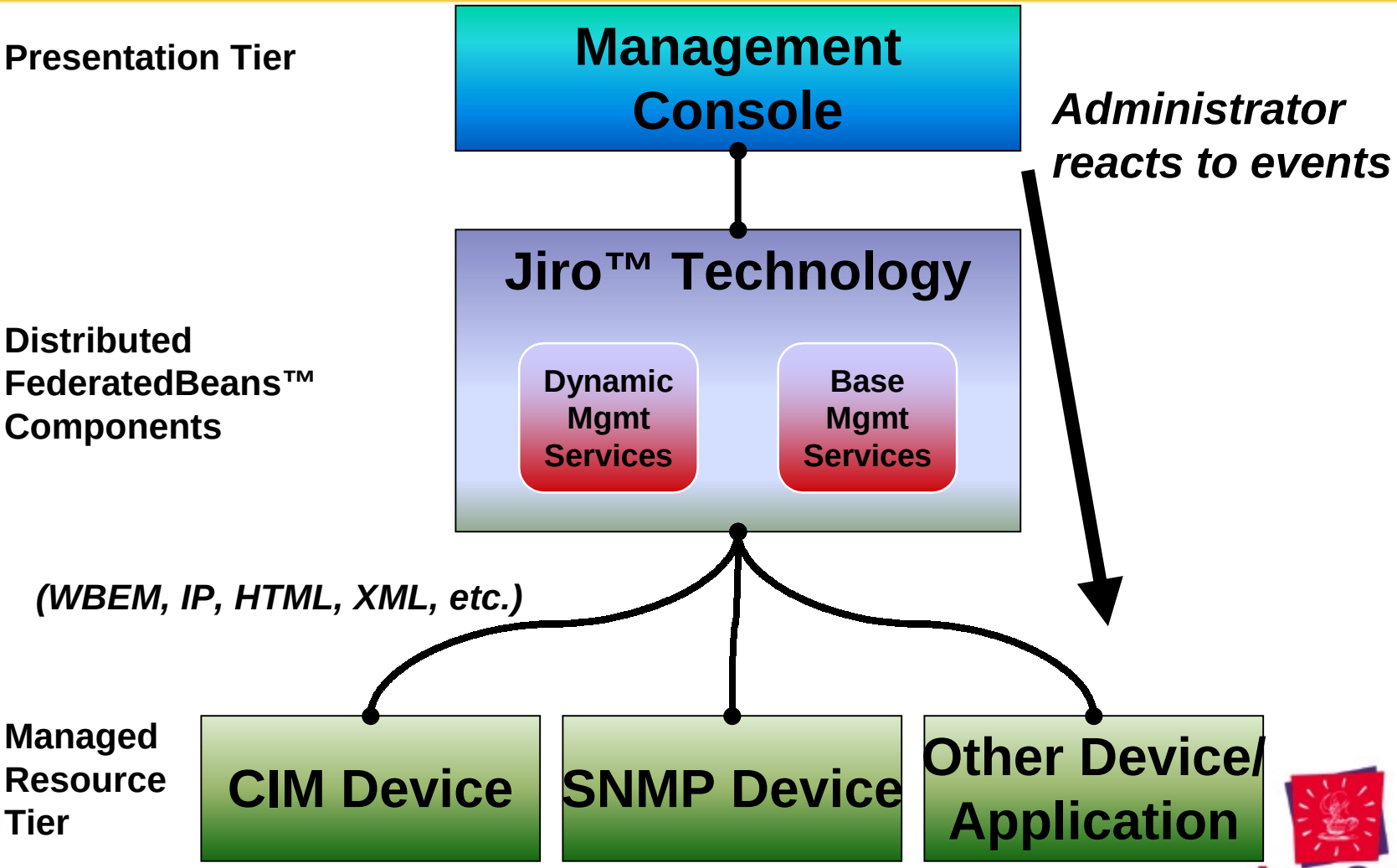
Agenda

- **Creating Management Façades**
- **Management Façade Details**
  - Array, Switch(s), Volume Manager, File System
- **Storage Pooling**
- **Achieving Application Continuance**
  - Capacity On Demand Application
- **Live Demonstration**
- **Summary**
- **Developer Panel Q&A Session**

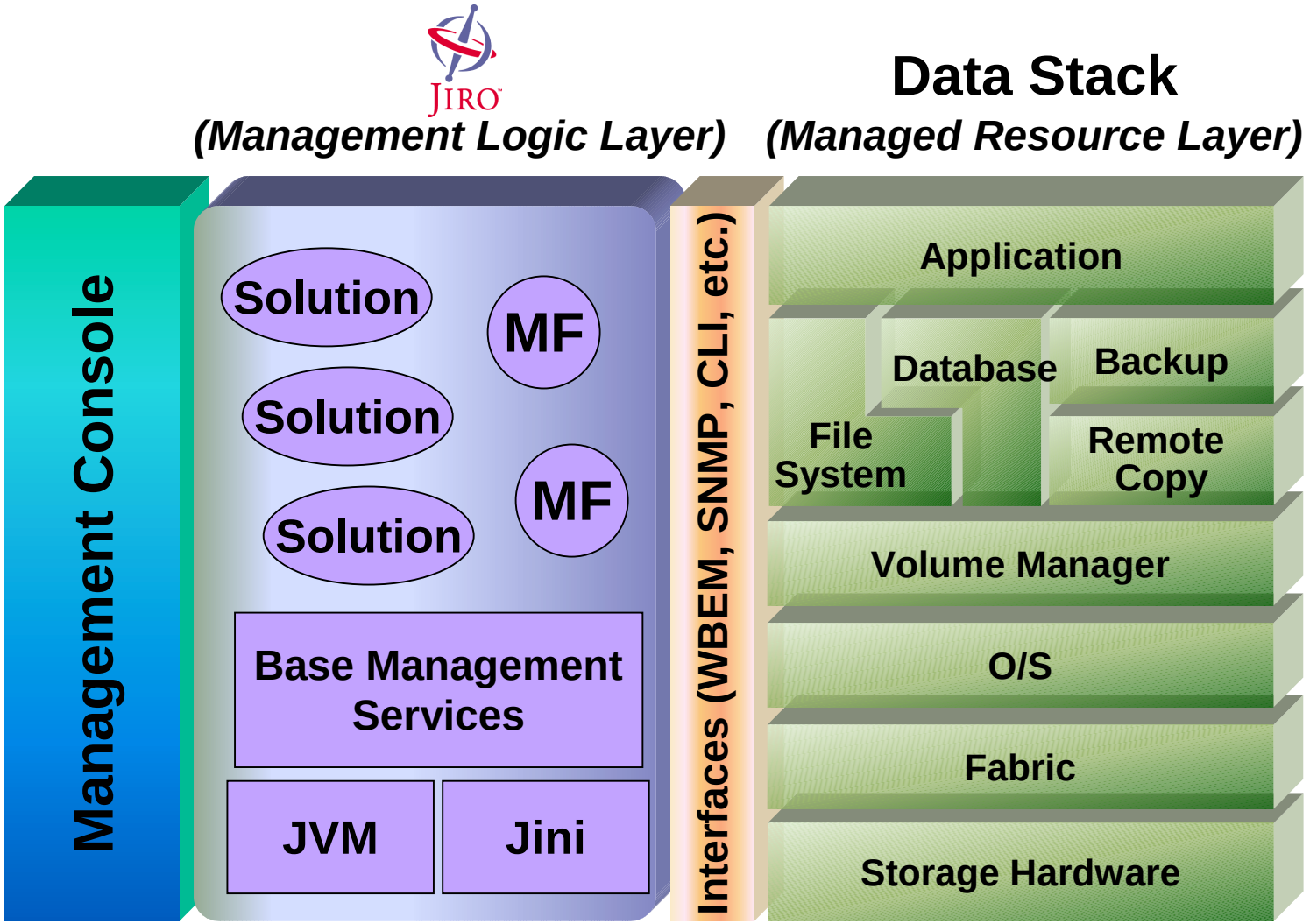
Management Today



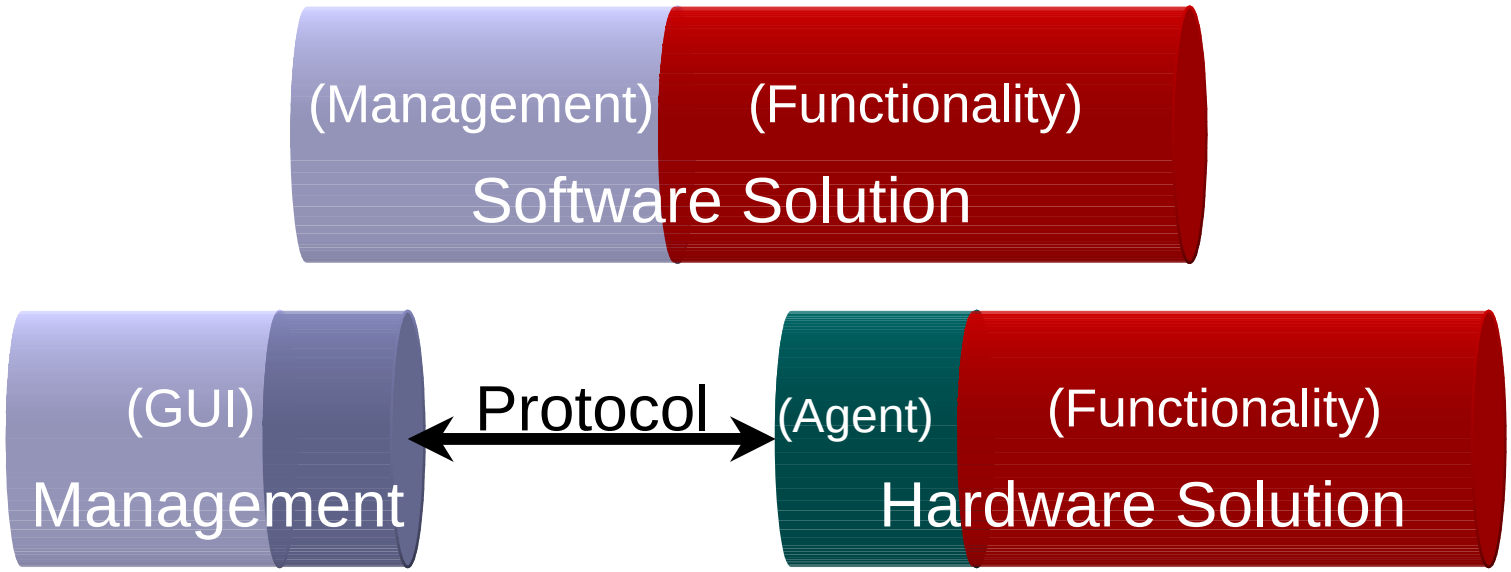
Jiro Technology Architecture



Jiro Technology Architecture Detail

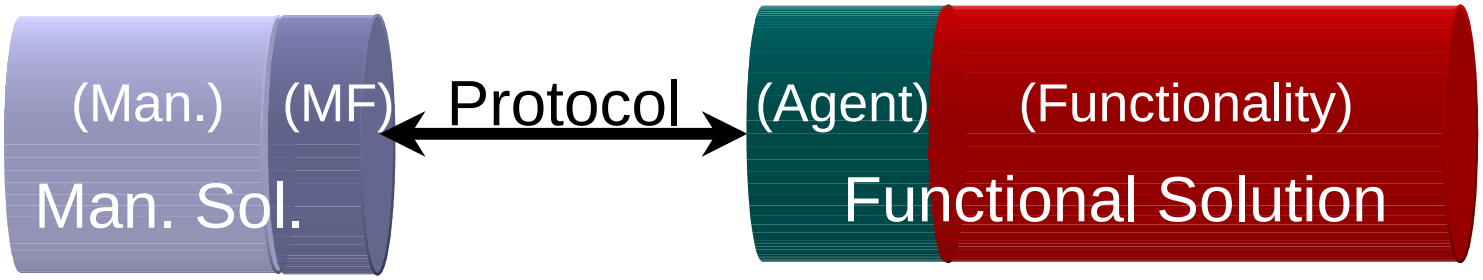


Management Services



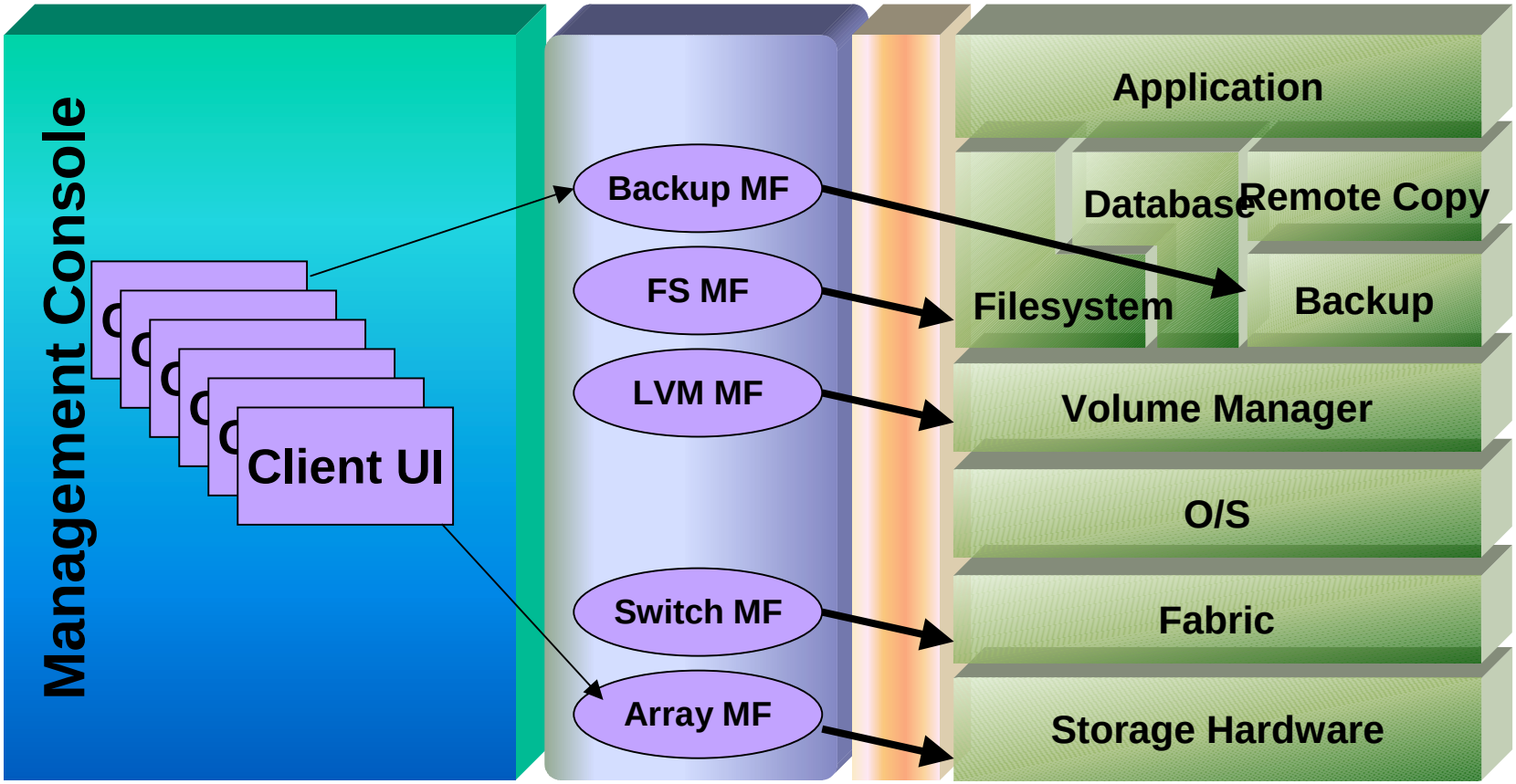
All resources, hardware and software, have a functional piece, and a management piece

Creating a Management Façade



Create a Management Façade (MF), a special bean that encapsulates the control functions and monitoring data for the resource

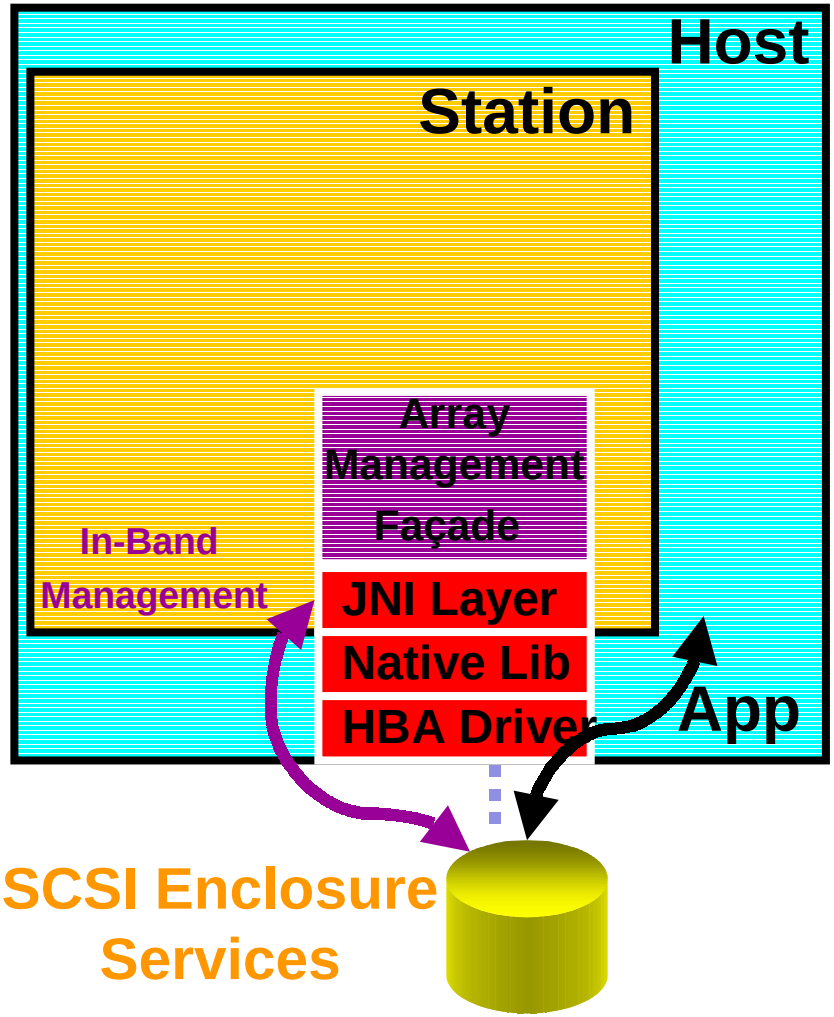
Jiro Technology Enabled Products



Array Management Façade

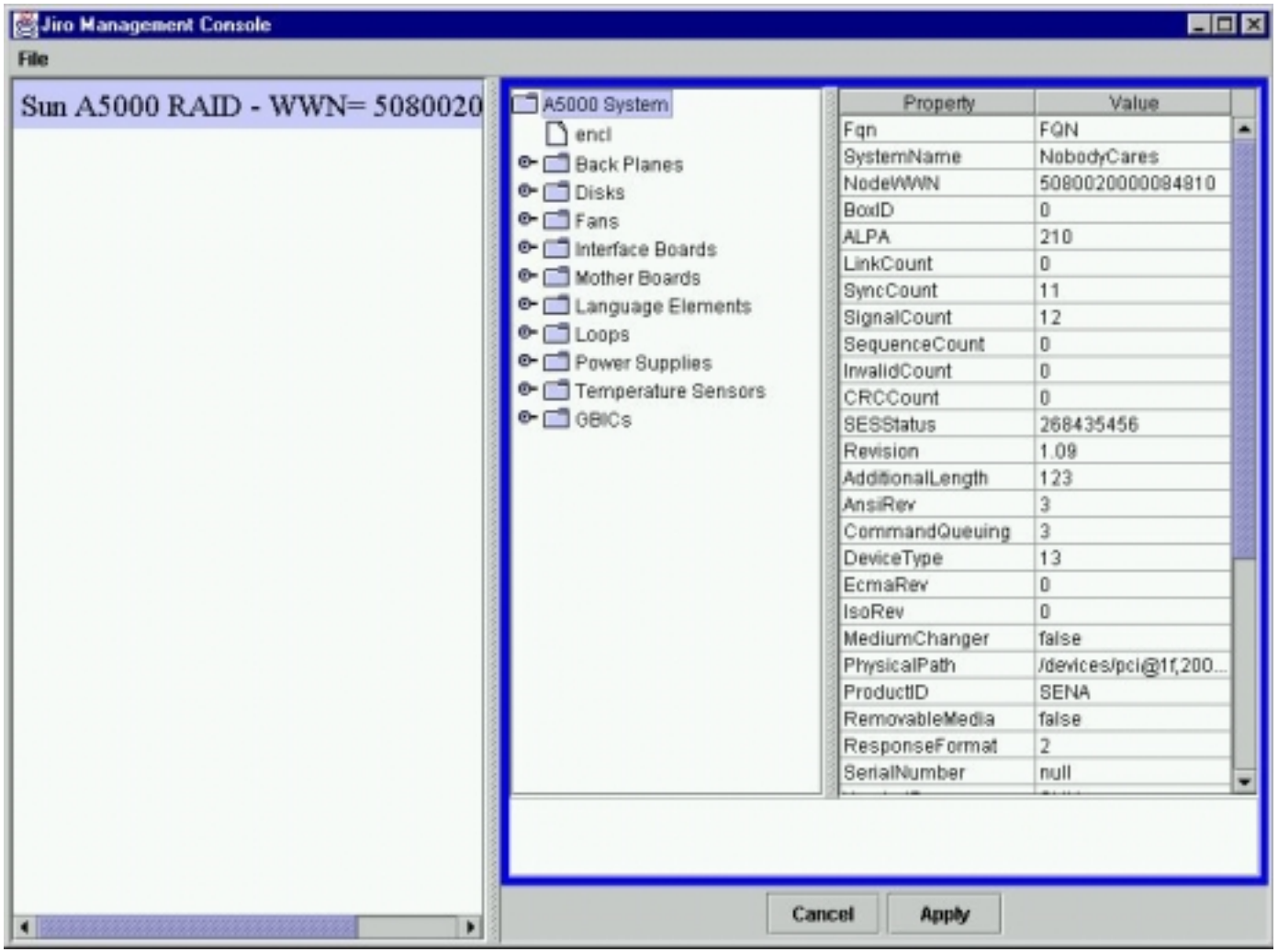
- Created to Jiro Enable the Sun StorEdge™ A5200 JBOD Array
- Developed by Imation
- Uses In-Band Management via a native library that supports the SCSI Enclosure Services standard
- Provides Single-Point-Of-Control via Jiro Technology Controller service for Array ownership

Array Management Façade

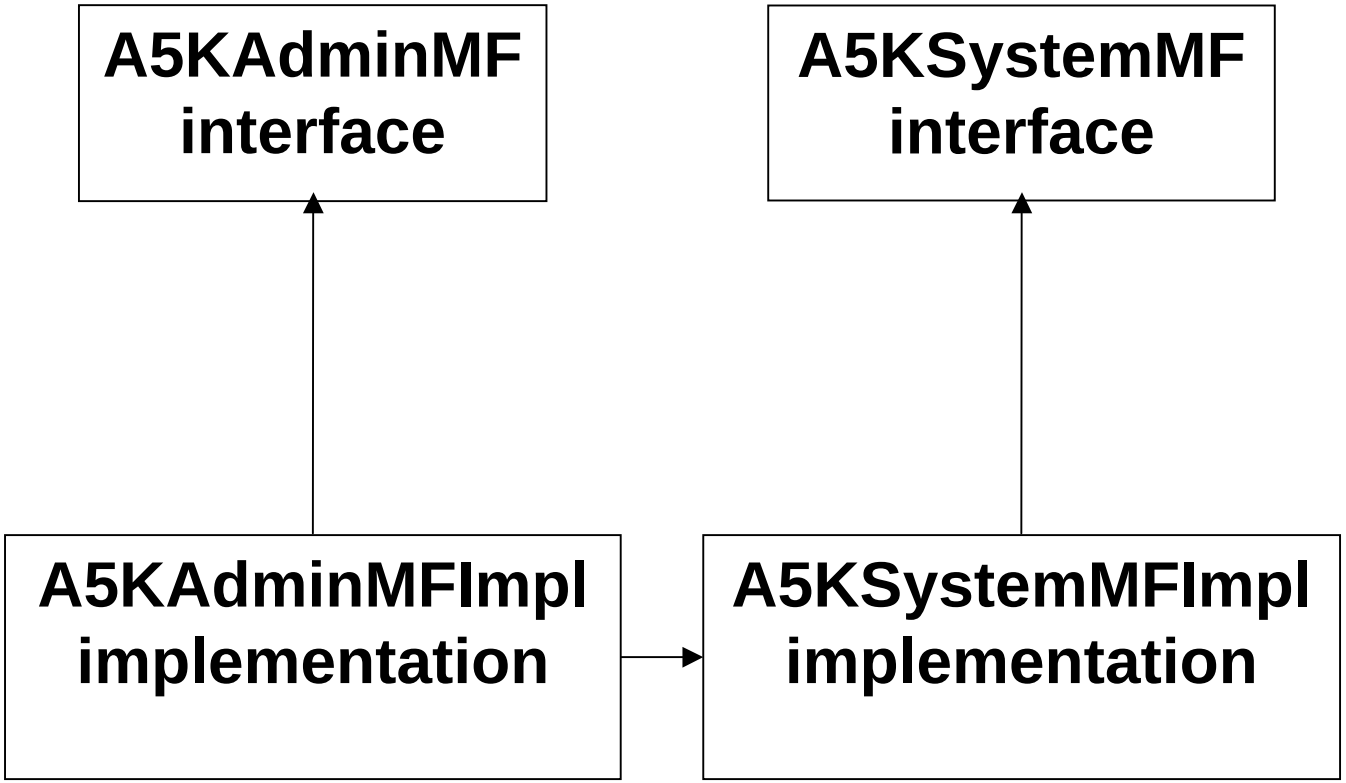


Translates method calls on the Façade to SES commands delivered in-band (through the same path as the data travels)

Array MF Client GUI



Array MF Design



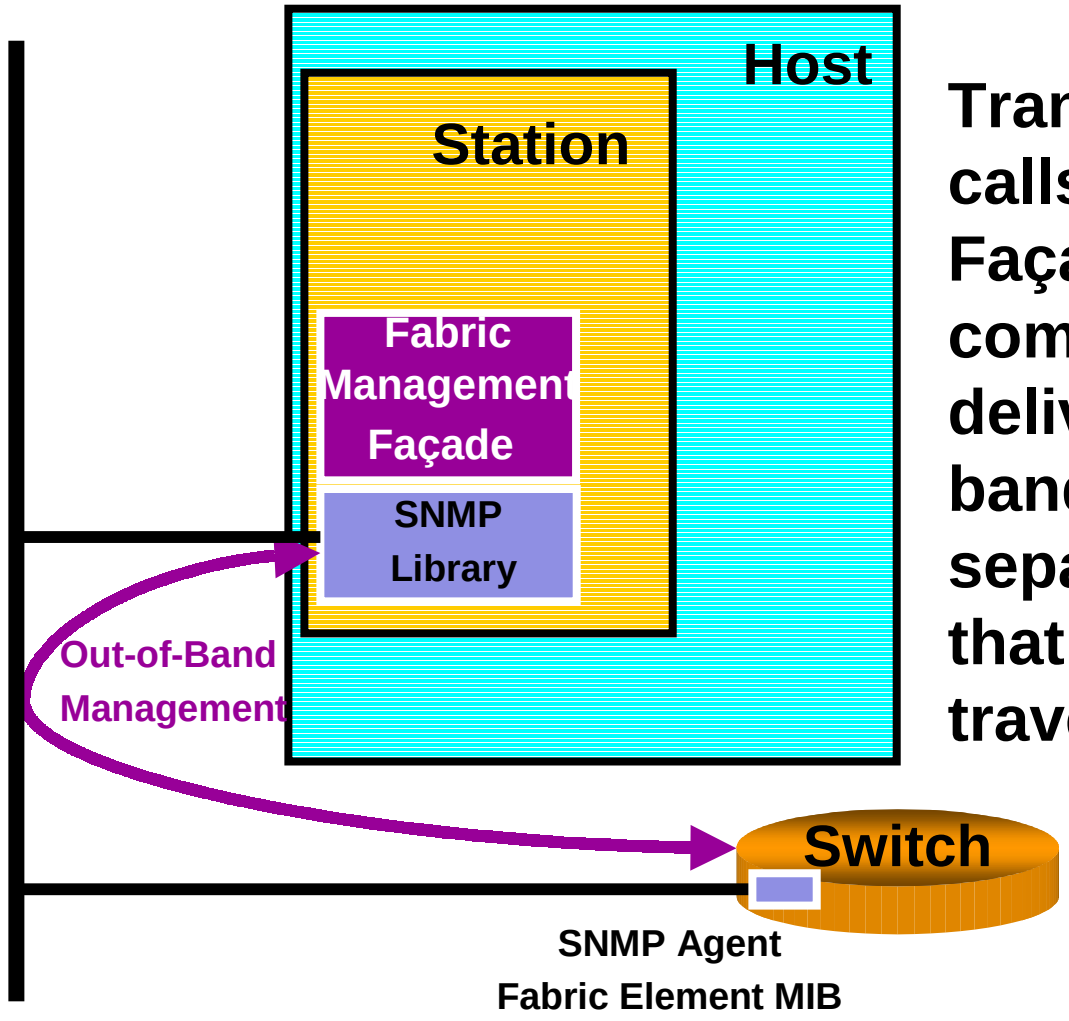
Array MF Interface

- The A5000 component represents various A5000 disk arrays which are attached to a Solaris machine
- It uses several Jiro Technology base management services during its lifespan including the Jiro Technology Scheduler to refresh information, Event Services to notify component users of changes, Logging services, persistence, and more
- The Java Interface contains both direct Java mappings of methods, as well as a CIM based interface

Ancor Switch Management Façade

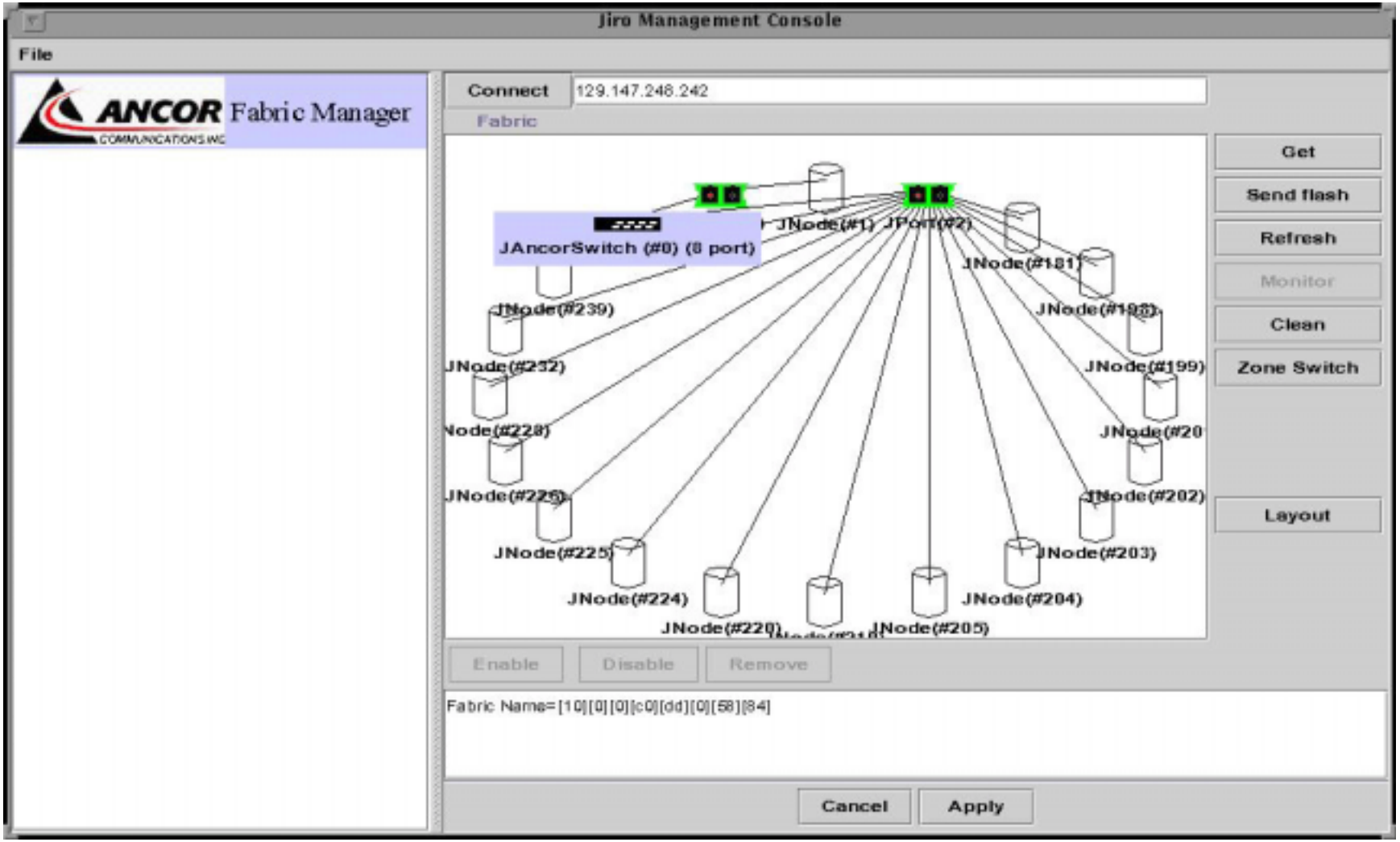
- Created to Jiro Enable Ancor SANbox™ Fibre Channel switch fabrics
- Uses Out-Of-Band Management via SNMP to Fabric Element MIB SNMP Agent
- Provides fabric Zoning functions on a per port basis

Ancor Fabric Management Façade



Translates method calls on the Façade to SNMP commands delivered out-of-band (through separate path from that the data travels)

Ancor Switch MF Client GUI



Ancor Switch MF Interface

```
public interface Fabric
{
   …
  /**
   * Adds a FabricListener to the list of FabricListener's that recieve
FabricEvents.
   * @param newOne  the FabricListener to be added.
   */
   public void addFabricListener(FabricListener newOne);
/**
   * Returns the IP address, in in a String, of the switch that this
class communicates with.
   */
   public String getSwitchAddress();
…
  /**
   * This function returns the first switch in the list of known
switches.
   */
   public Switch getFirstSwitch();

  …
```

Ancor Switch MF Interface

```
/**
  * Retrieve the Fabric Name
  */
  public byte[] getFabricName() throws SwitchException;
…
 /**
  * Retrieve the Element Name
  */
  public byte[] getElementName() throws SwitchException;
…
/**
  * This function tells the Fabric class to forget what it knows about
this particular fabric
  * and rediscover the fabric.
  */
  public void refreshFabric();

}
```

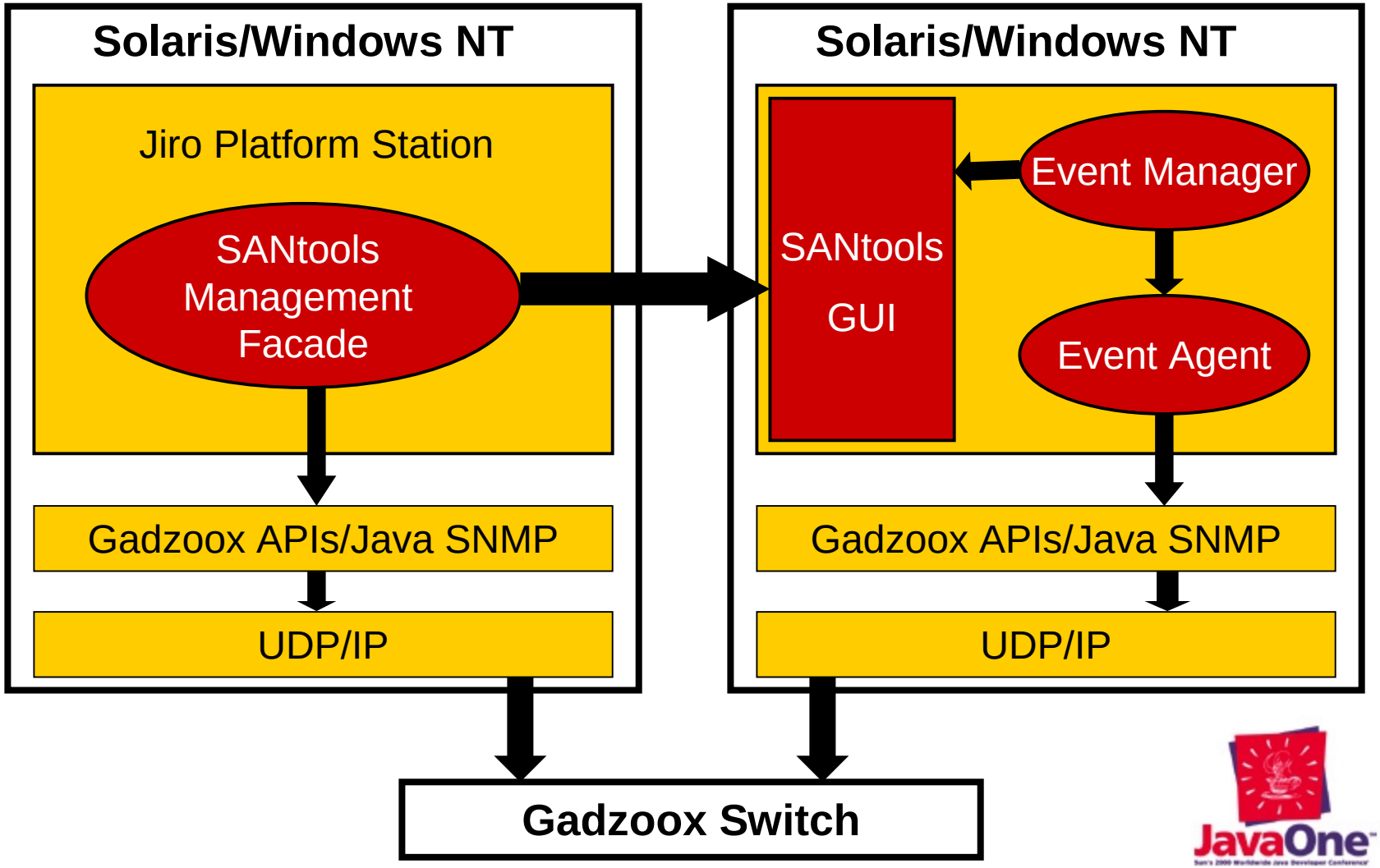
Jiro Platform Demo for GADZOOX SANtools

- **SANtools Management Façade**
  - Communicates with Gadzoox Capellix through SNMP
  - Exposes properties of Gadzoox Capellix Switch to Jiro components through management façades and their proxies
    - Chassis: identification, health, service, help
    - Plug-in modules: information, ports summary
    - Ports: information, configuration

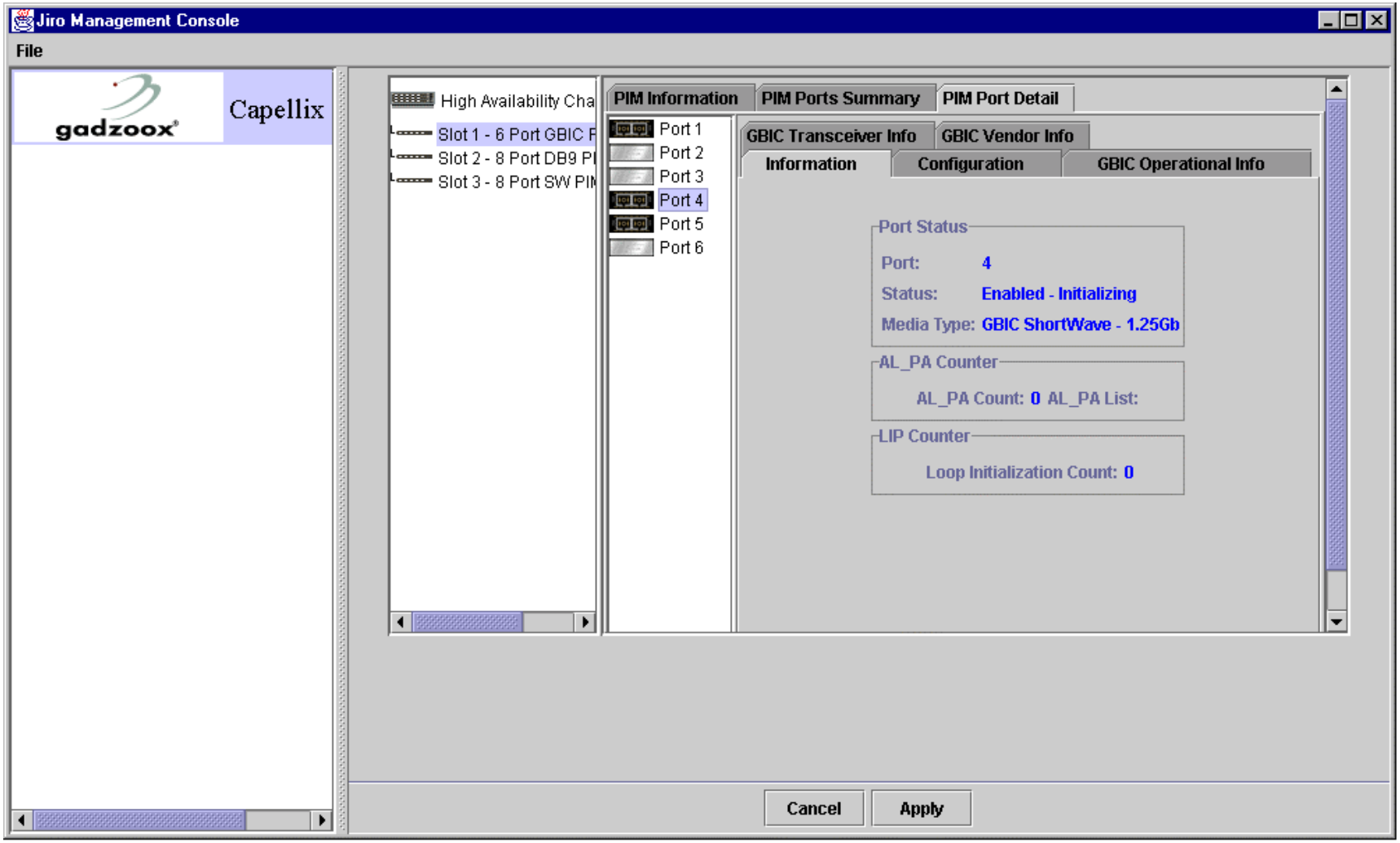
Jiro Platform Demo for GADZOOX SANtools

- **SANtools Customized GUI**
  - Manages Gadzoox Capellix Switch using management façade proxy through rich, and intuitive user interface
  - Integrates successfully with Jiro Console GUI
  - Generates and receives events using Jiro Event Service
  - Generates and receives log messages using Jiro Log Service

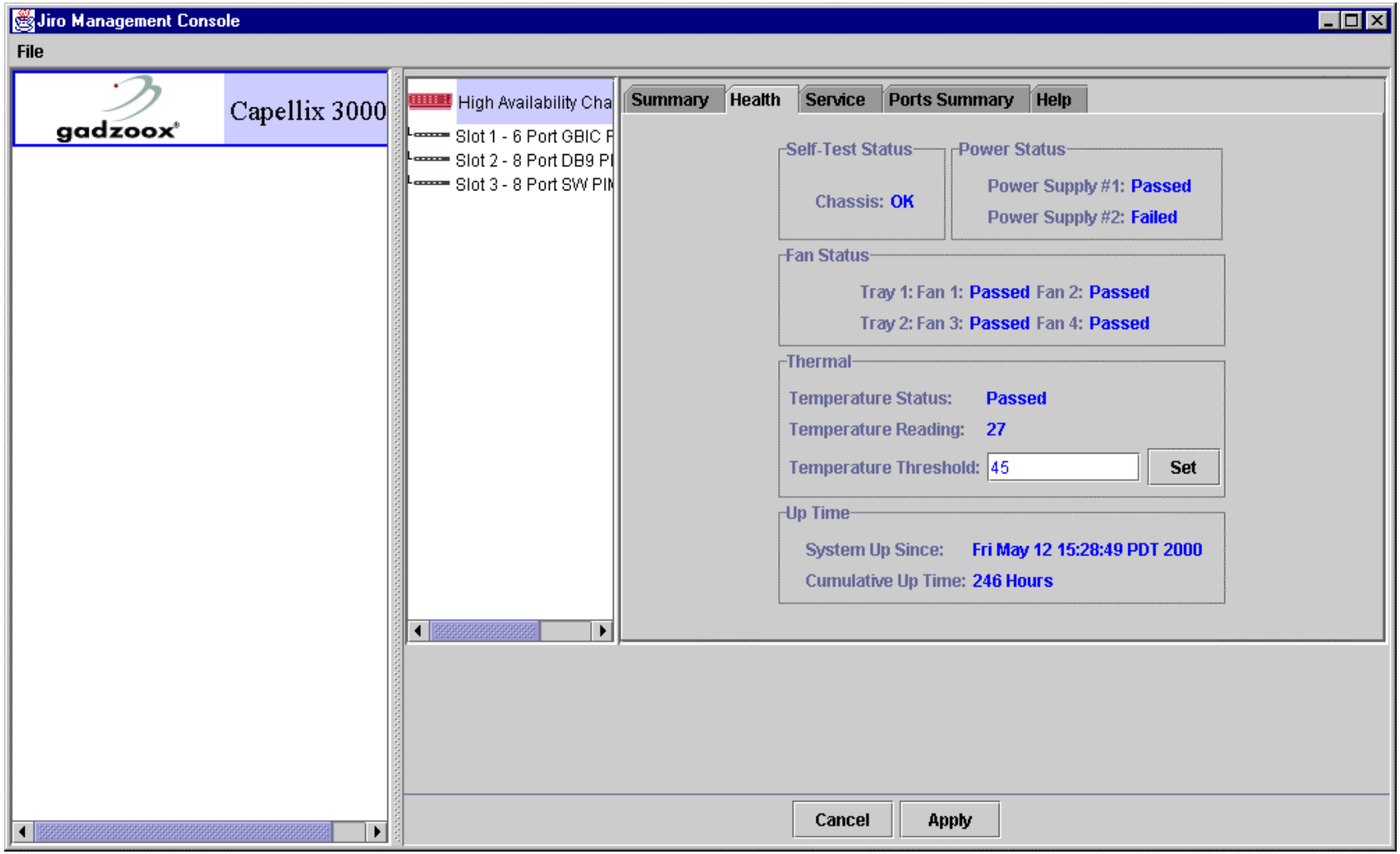
Jiro Platform Demo for GADZOOX SANtools



Jiro Platform Demo for GADZOOX SANtools



Jiro Platform Demo for GADZOOX SANtools



Jiro Platform Demo for GADZOOX SANtools

- **Hands-on Experiences**
  - Powerful APIs
    - Documentations, Samples, Tutorials
    - Bulletin Board Service
  - Useful tools
    - Igniter—start all jiro services
    - Proxygen or jiroc—generate proxy
    - Jijar—generate -if.jar, -dl.jar, -impl.jar

Jiro Platform Demo for GADZOOX SANtools

- **Hands-on experiences (Cont.)**
  - Issues
    - Documentations, samples, tutorials
    - Package names
    - Circular references
    - Network class loading
    - Deployment

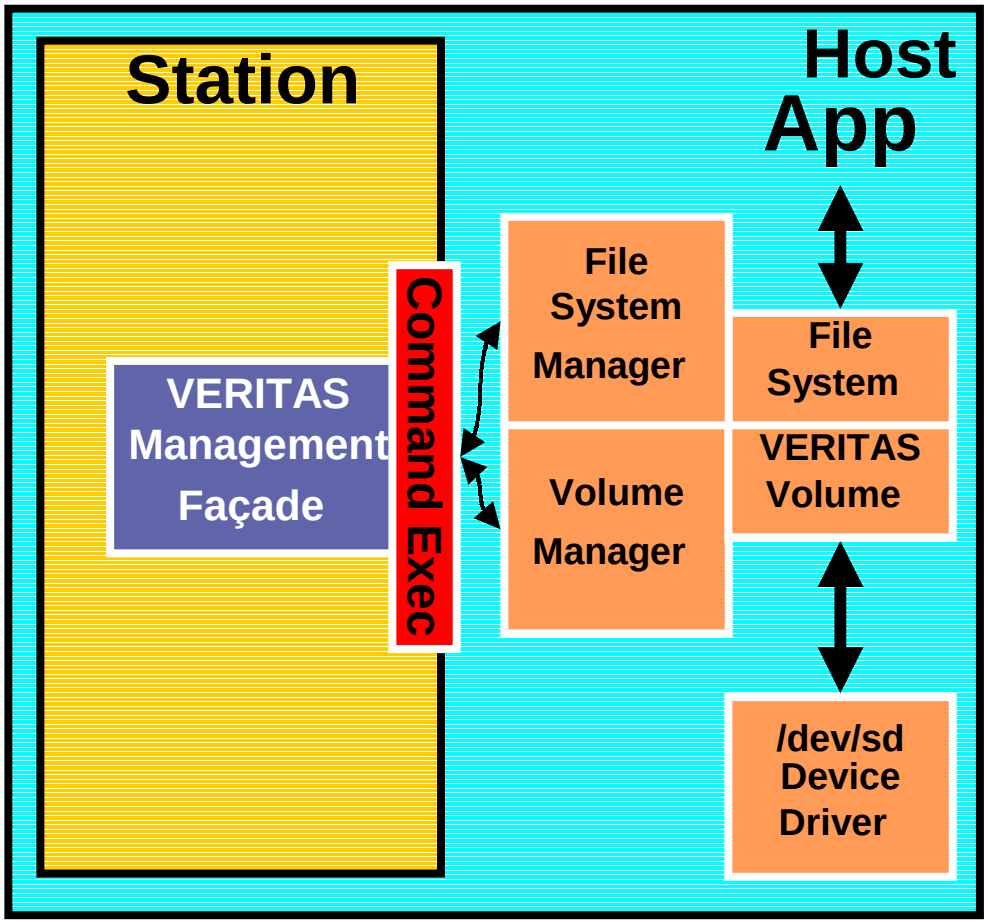
Jiro Platform Demo for GADZOOX SANtools

- **Gadzoox and The Jiro Platform**
  - Make Gadzoox APIs Jiro platform-enabled
  - Migrate management software to be Jiro platform compliant
  - Integration Jiro with CIM, WBEM, XML

VERITAS Software Management Façade

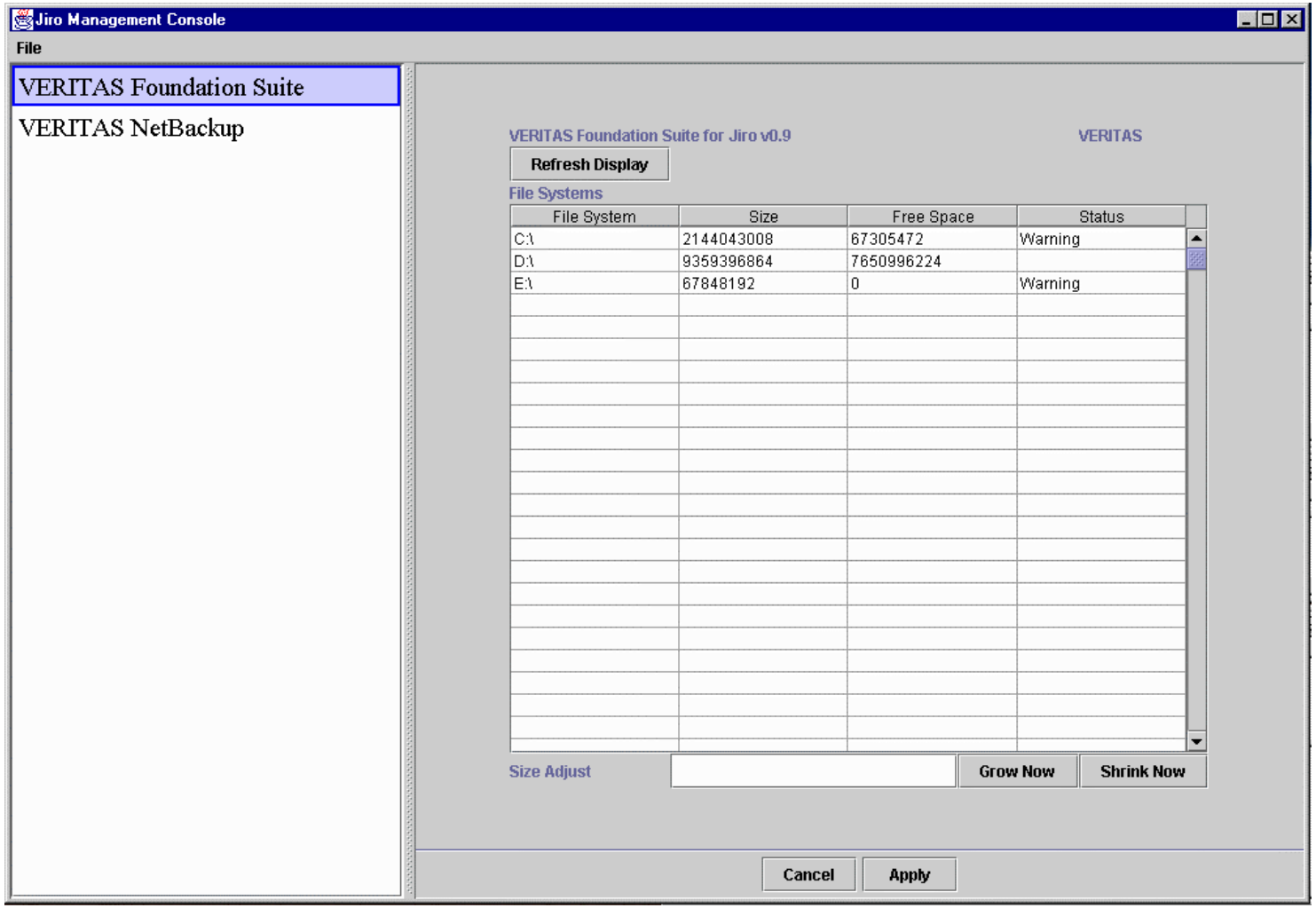
- Created to Jiro Enable the VERITAS Volume Manager™, VERITAS File System™ and VERITAS NetBackup products
- Single MF for now, will split into two MFs for production
- Uses command line invocation and parses results

VERITAS Software Management Façade

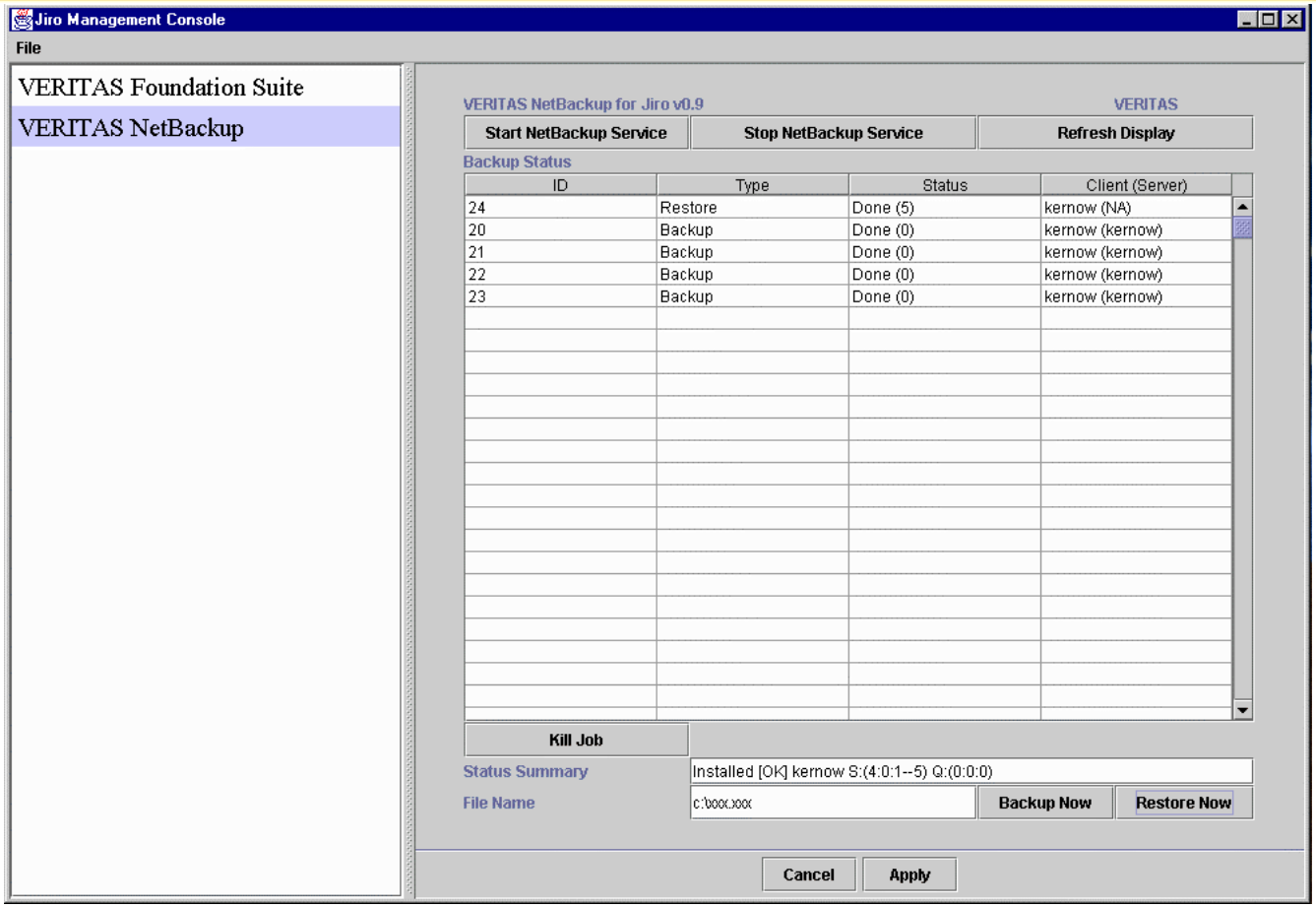


Translates method calls on the Façade to commands on the corresponding applications, parses results to understand success/failure

VERITAS Software
MF Client GUI



VERITAS NetBackup MF Client GUI



Offers backup/ restore services for use by other Jiro Technology components

VERITAS Software MF Interface

- Offers services for volume and file system management utilizing the VERITAS File System and VERITAS Volume Manager—for both Solaris and NT
- The most important of which is the growing and shrinking of a file system while it is online

CreekPath Systems, Inc. and Jiro Technology

- Member Jiro Core Expert Group
- Prototype Exabyte Library MF
- FMA Log Service

CreekPath™
SYSTEMS

JavaOne

CreekPath Systems, Inc. and Jiro Technology

- Crossroads 4250 Router MF
- Generating JiroTM Technology-based Management Facades From the CIM Model TS-1162

CreekPath™
SYSTEMS

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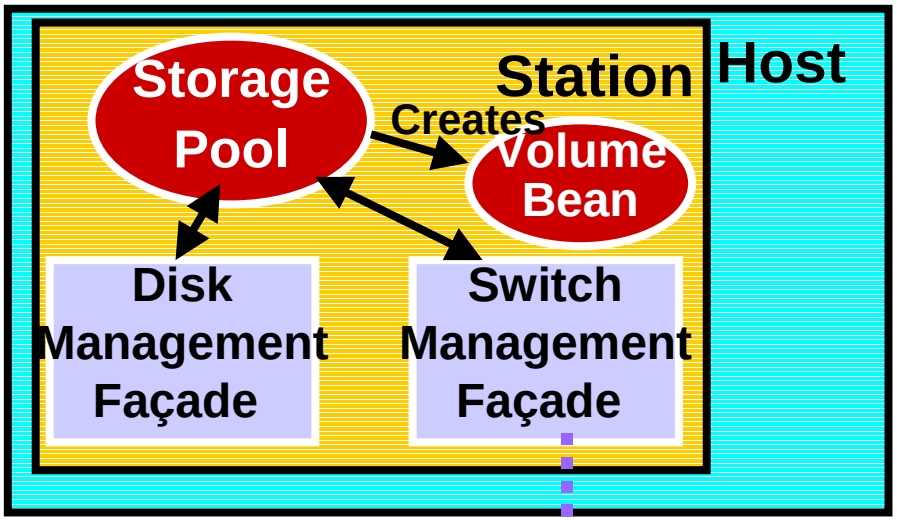
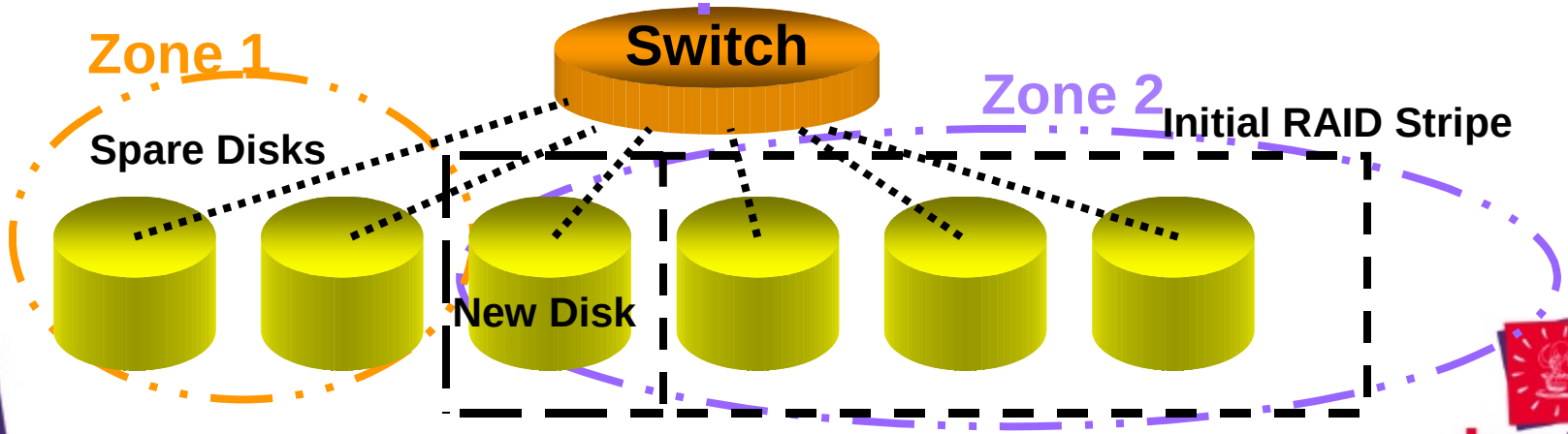
Storage Pooling

- **Storage networks introduce the ability to share storage devices among multiple hosts**
- **Today, allocation to host is a manual, error-prone procedure**
  - Must understand switch zoning commands
  - Mistakes may cause loss of data

Storage Pool Management Logic Application (Bean)



Discovers new storage, adds to pool
Allocates storage to a host by using zoning method on Switch MF



Storage Pool Bean

- **Can act as an application**
  - Client GUI allows for manual allocation
  - Hides details of zoning, LUN masking
- **Can be used as a component**
  - Used by failover components to get a spare or replacement disk
  - Used by capacity management components to allocate more storage as needed
- **Creates Volume Bean**
  - Component representing SAN Disk or LUN and the path through the Fabric from the host

Storage Pool Bean Interface

```
public interface StoragePool {

    // The Infinite disk bean calls for more space using this
    // interface.
    public Object Allocate(long reqsize) throws
IOException;

    // Applications can use this interface to return disks which they
    // want are no longer using and want to free them.
    public void FreeList(Object free);

    // The interface is used to get the list of free disks
    public void GiveFreeList();

    // The interface is used to get the list of allocated disks
    public void GiveAllocatedList();
}
```

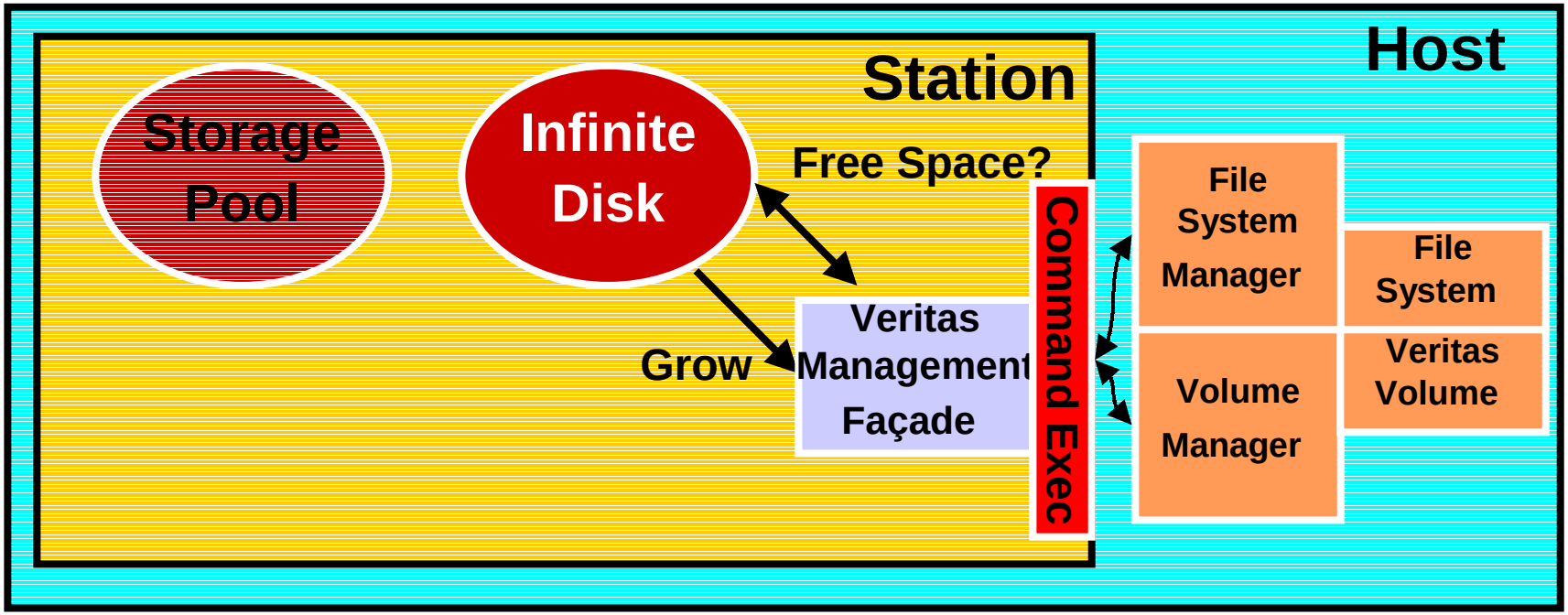
Continuous Storage Availability

- **Application availability enhanced through multiple components**
  - Healing, Failover, Diagnosis
  - Configuration Policy (redundancy)
  - Automation of Capacity Management (capacity on demand)
- **Can apply to individual elements or to entire service level**
  - Integrated management of all storage resources that the application is using

Capacity on Demand

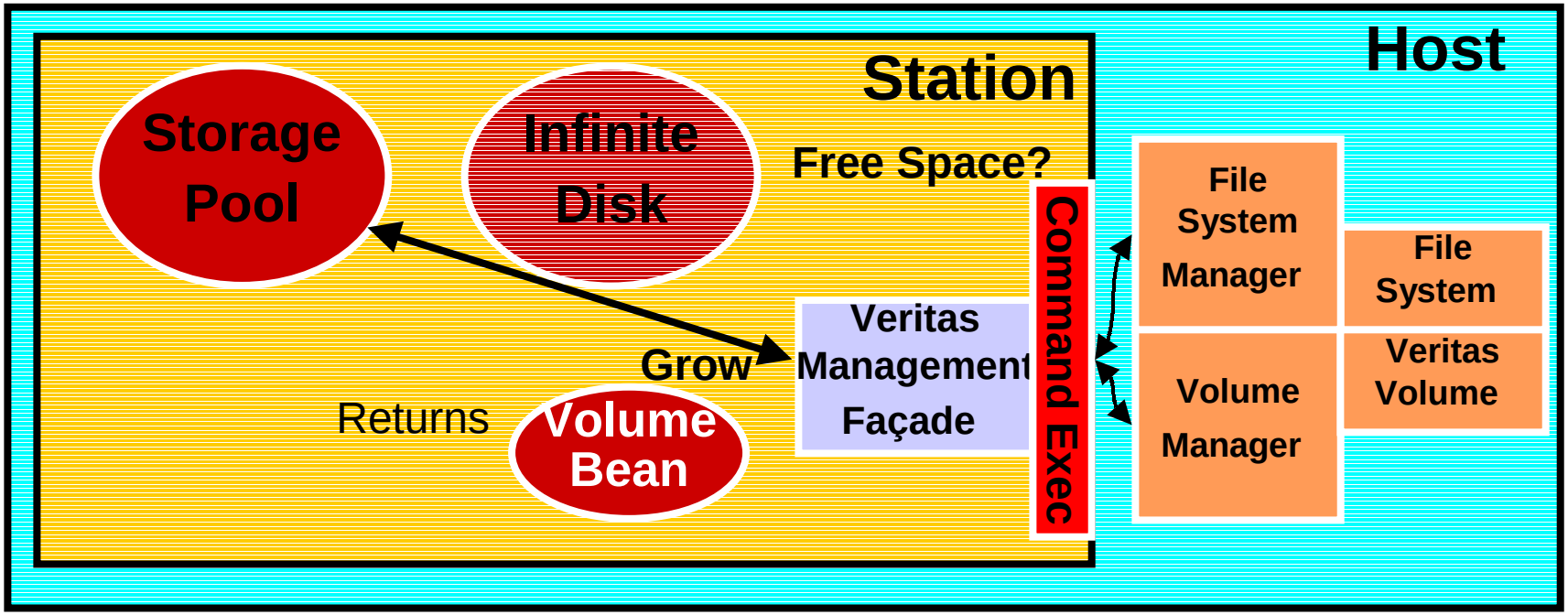
- **FederatedBeans™ Component to monitor application's storage usage**
- **Predict capacity problems (before out of space indication)**
- **Allocate more storage to the application server**
- **Use new storage to increase capacity for the application**
  - Grow Volume, Grow File System Dynamically

Infinite Disk Bean



- When Free Space Threshold is exceeded, ask File System to grow

Capacity on Demand



- Veritas MF then gets new disk (Volume Bean) from the Storage Pool, grows volume, file system

Result

- Business Critical Application never fails due to resource constraints
- Capacity planned, managed across multiple hosts
- Administrator freed from fighting capacity fires to keep application running
- Business Policy: Never run out of storage—is achieved

JavaOne Demo

Demonstration

Summary

- **Jiro Technology enables more than just the monitoring of resources**
  - Introduces management control
- **Enables Integration of the management for multiple resources**
  - Management is abstracted to higher level
- **Enables Automation of management**
  - Frees Administrators to do more planning and policy based management

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Q&A

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