Coherence JMX Management Framework and Reporter

London Coherence SIG

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Agenda

- Introduction/Disclaimer

- Acquiring Coherence Management Data

- Coherence JMX Reporter

- Next generation Coherence Management

- Extending Coherence with custom MBeans.

Acquiring Coherence Management Data

- Issues and Concerns

- Original Design and Optimization Patterns

- Coherence 3.4 upgrades

- "Real World" improvements

Issues and Concerns

- Data Accuracy

  - Time skew of data – The number of milliseconds between the first data element and the last data element of a snapshot.

  - Data Latency – How current is the data.

  - Sampling Frequency

- Capacity Consumption

  - MBean explosion

    - Number Caches * Number of Nodes (n-squared).

  - Peak vs Average consumption
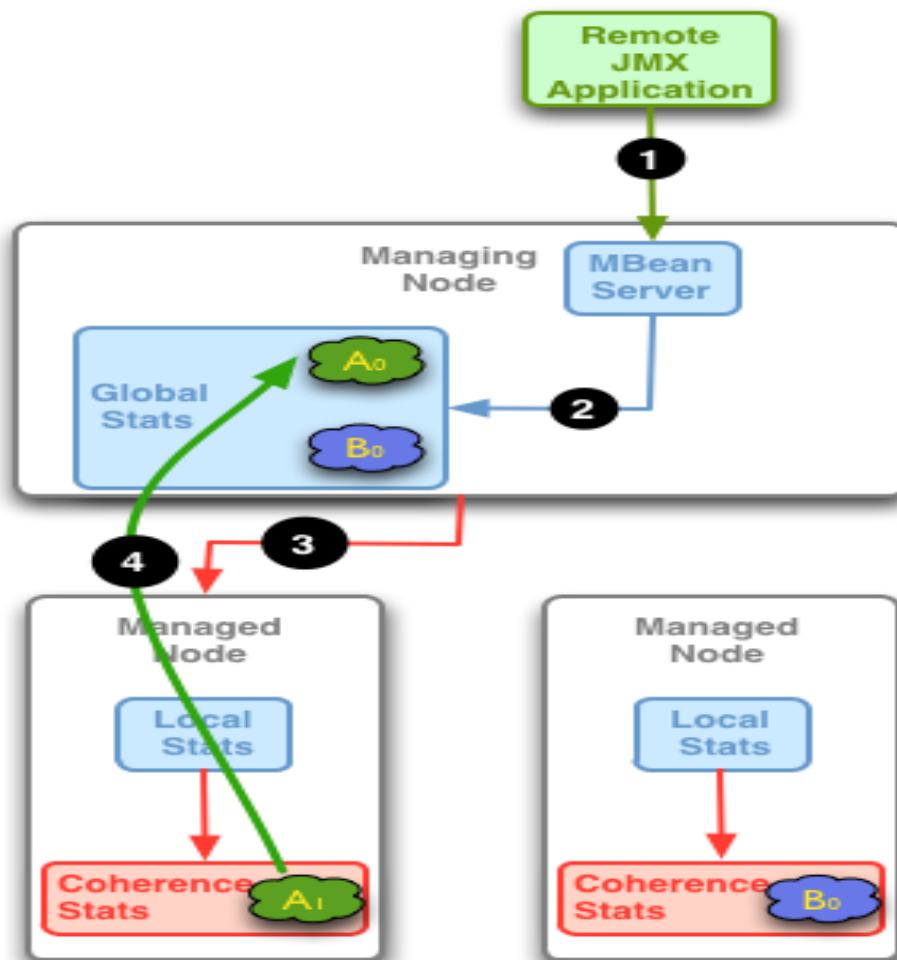
  - Sampling Frequency

Questions?

Acquiring Management Data (original)
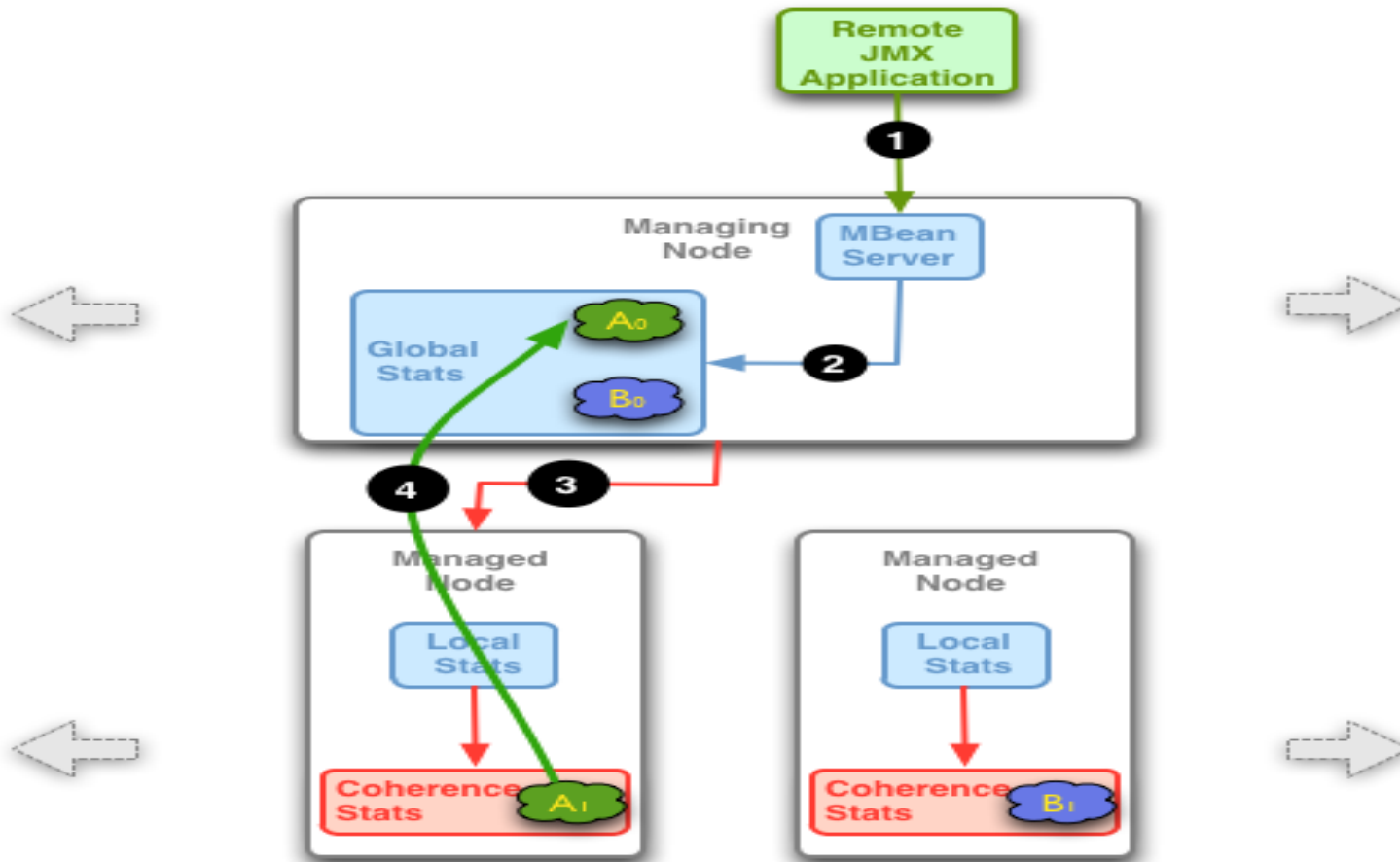
Issues with Original (refresh on demand)

- Current Data

- High Time skew of data

- N-squared communications

- Long time between sampling frequencies.
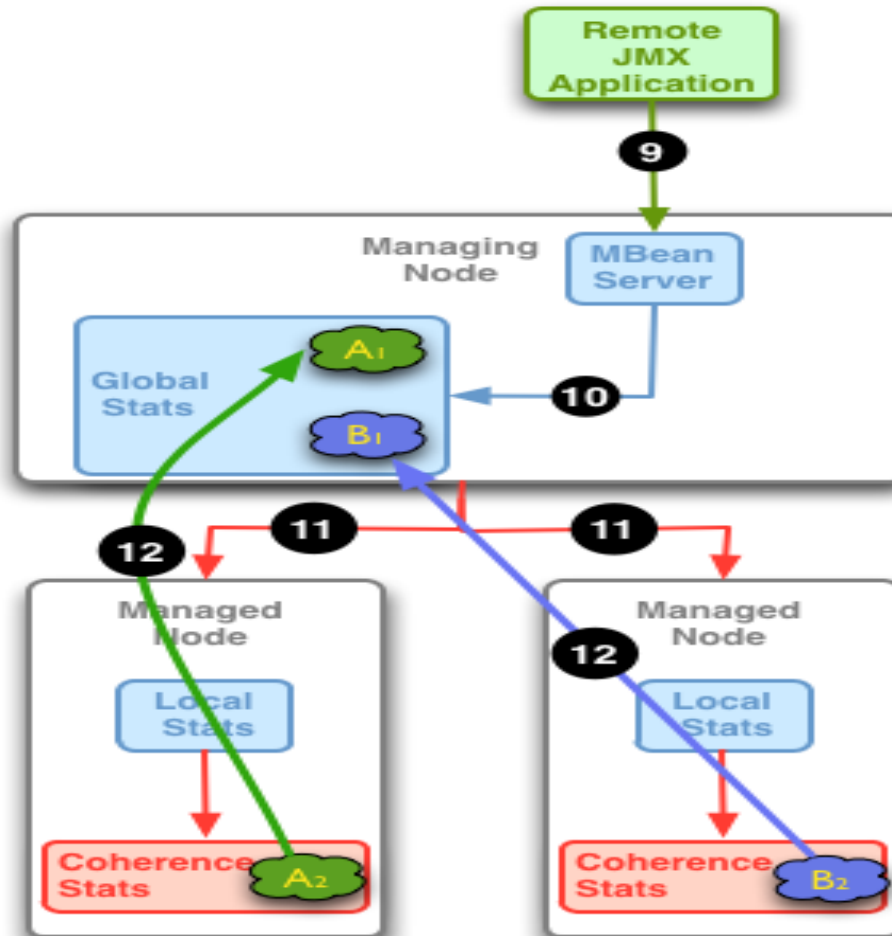
- Longer time to incident notification.

Acquiring Management Data (pre-fetch)
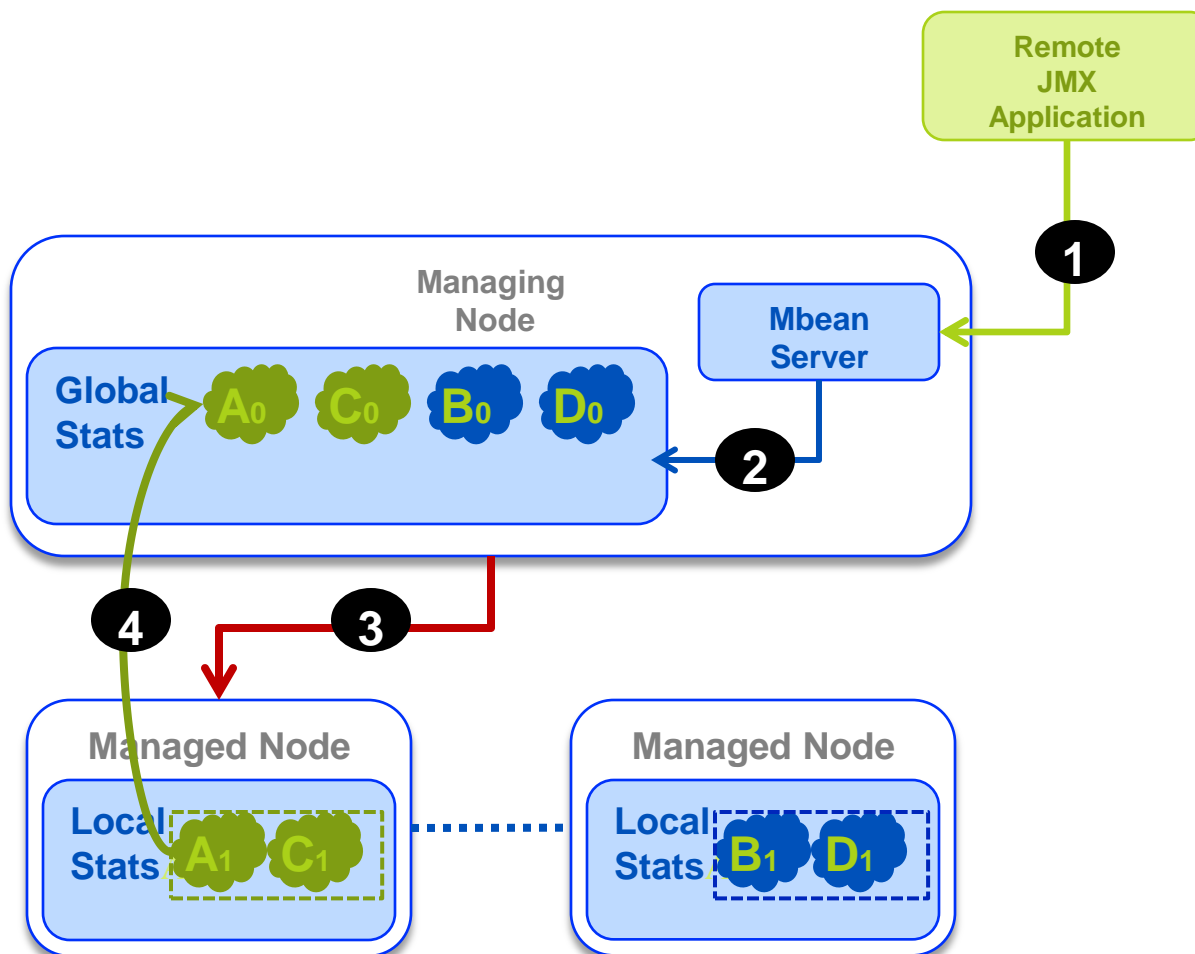
Acquiring Management Data (pre-fetch)

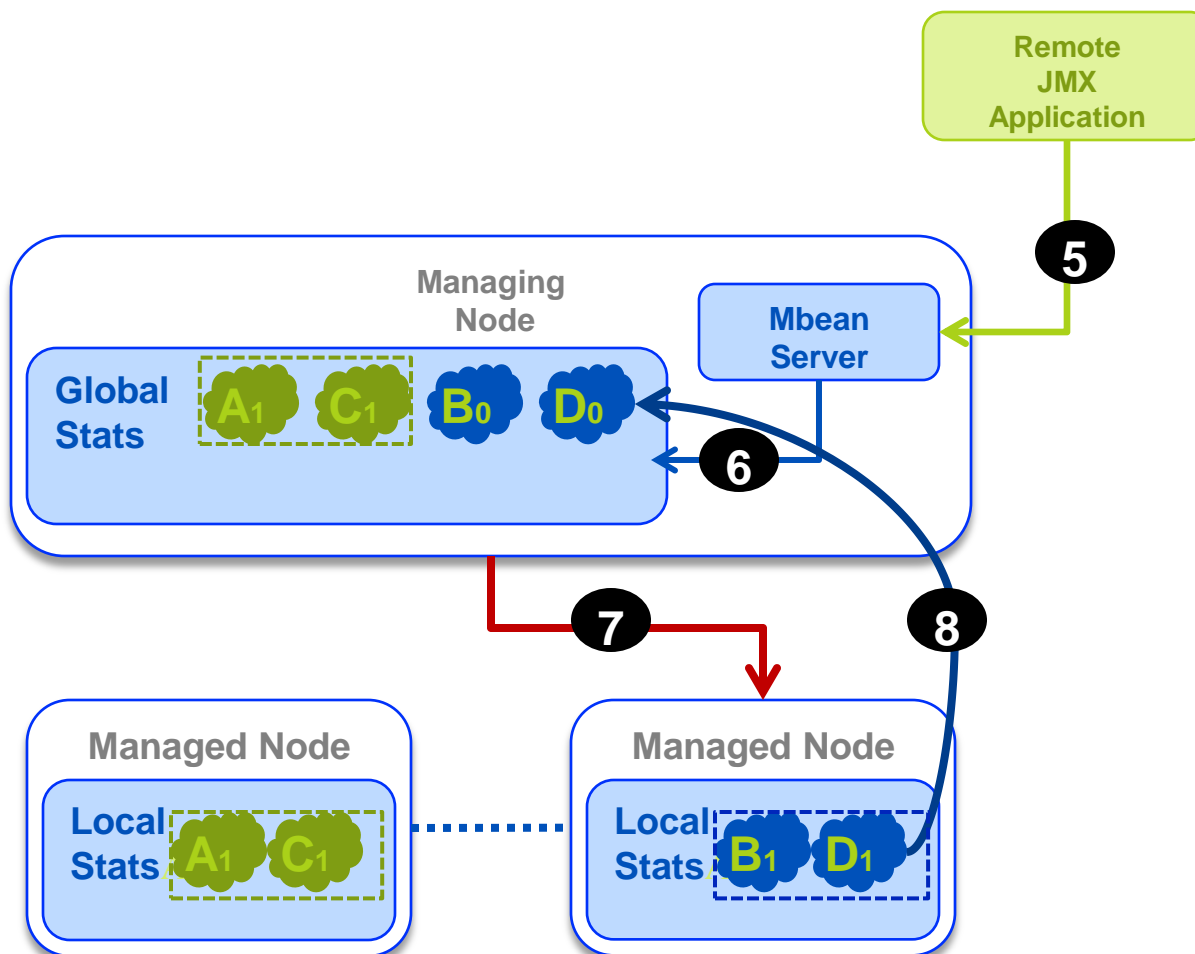# Acquiring Management Data (pre-fetch)

Privileged and Confidential
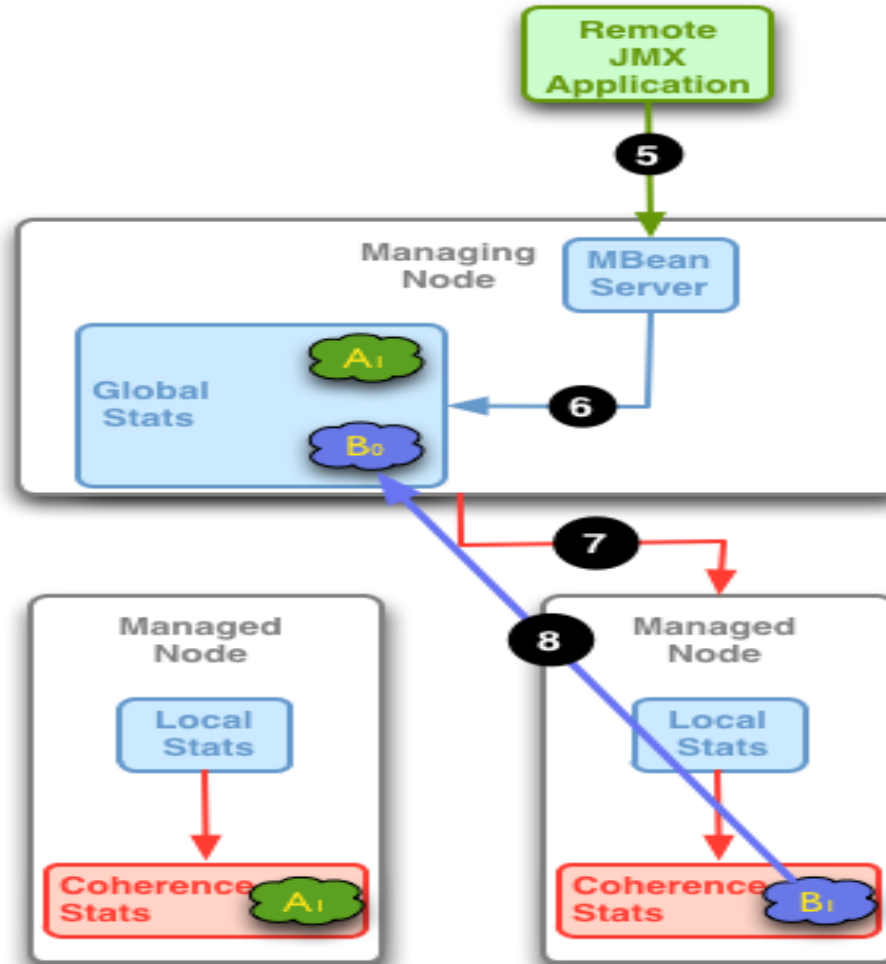
Issues with prefetch

- It takes at least one cycle to determine the pattern

- Multiple usage patterns on the same node significantly impacted performance

- Increased the maximum load on the coherence nodes (spike)

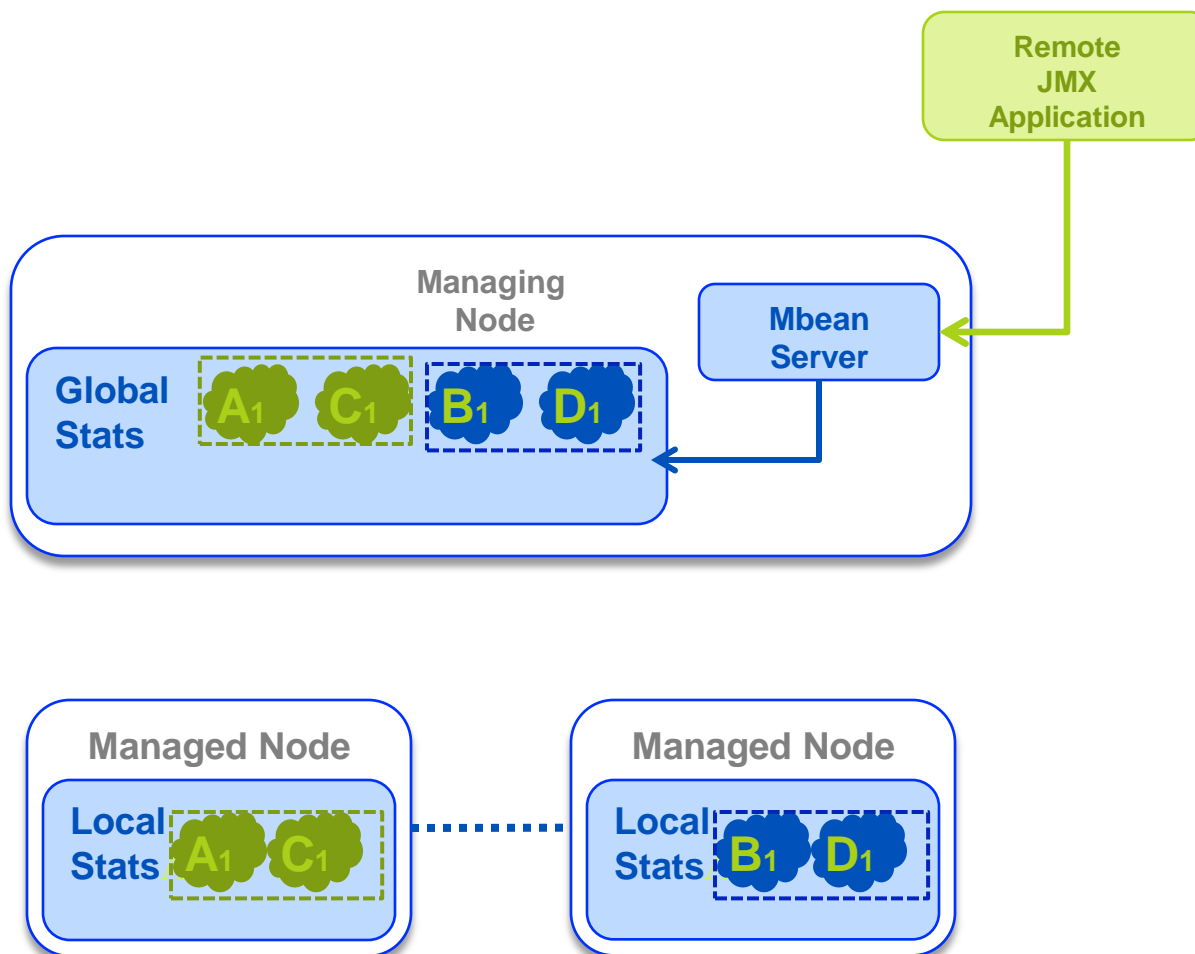- Increased the load on the managing node (client).

- n-squared communications.

Acquiring Management Data (real world)

Acquiring Management Data (batch)

Acquiring Management Data (batch)

Remote JMX Application

Managing Node

Mbean Server

Global Stats A_1 C_1 B_1 D_1

Managed Node

Local Stats A_1 C_1

Managed Node

Local Stats B_1 D_1

Batch Retrieval

- Optimized for snapshots

- Minimizes Time Skew of data from each node and overall cluster.

- Independent of refresh policy

- Order N (node count) communications per snapshot.

- Significantly reduces the load on the cluster. ~(factor of 3)

- Significantly reduces the time from incident to notification.

Questions?

JMX Reporter

- Original design and goals

- Configuration

- Starting, Stopping, Status

- Data Generated

- Reporter Features

Original Design and Capabilities

- Designed for POC teams.

- Zero additional infrastructure

- JMX Capture Utility

- Central and Distributed execution model.

Configuration (Report Definition)

- JMX Query

- Simple Join

- Row operations (add, subtract, divide)

- Aggregations

- Delta Operations

- Row Filters

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Configuration (Report Group)

- Report Groups are a set of report definitions that are run together.

- There is one report-group per node.

- Out of the box report groups

  - Report-all.xml – all the reports will be executed

  - Report-group – standard reports.

  - Report-web-group.xml - Standard Reports + coherence web reports.

Standard Report Group

- Cache Usage (Hits, gets, puts, etc)

- Service Information (Tasks, Requests, etc)

- Network Health (Publisher/Receiver Success Rates, packet information)

- Network Health Detail (by node)

- Node listing

- Management Performance.

- Proxy Node and Proxy Connection.

- Each Row of Data is stamped with a batch number, a report time, and refresh time.

Starting and Stopping

Privileged and Confidential
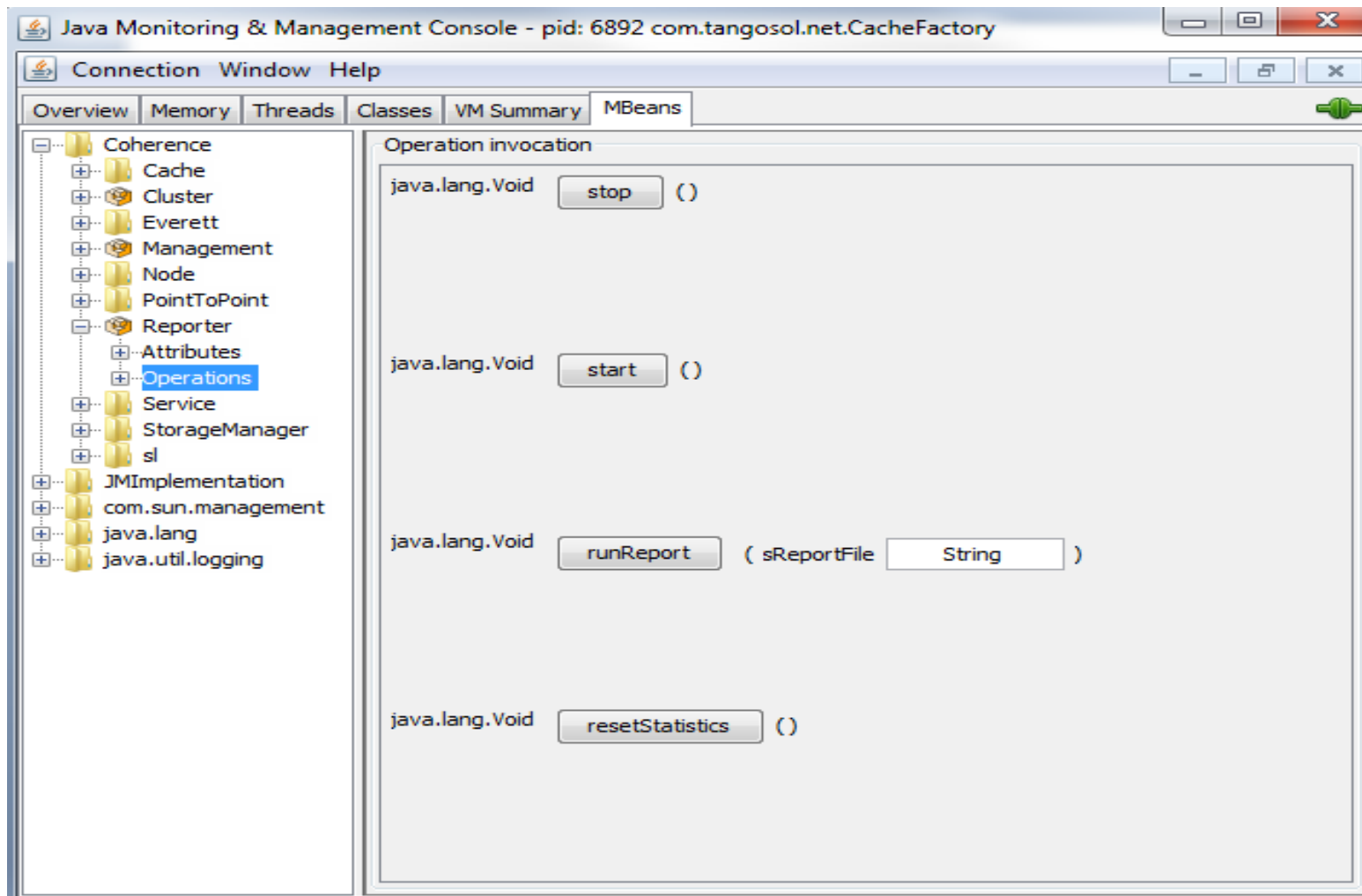
Command Line

- AutoStart

  - -Dtangosol.coherence.management.report.autostart=true

- Report Group

  - -Dtangosol.coherence.management.report.configuration=<file>

Reporter Status

Privileged and Confidential

Reporter Status

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Reporter File Listing


```
                6 File(s)           39,934 bytes
                0 Dir(s)  195,846,725,632 bytes free

C:\training>dir 20*.txt
 Volume in drive C is OS
 Volume Serial Number is 2A1A-DF6E

 Directory of C:\training

01/20/2011  03:59 PM            3,681 2011012015-cache-usage.txt
01/20/2011  03:59 PM            2,967 2011012015-Management.txt
01/20/2011  03:59 PM            7,060 2011012015-network-health-detail.txt
01/20/2011  03:59 PM            1,709 2011012015-network-health.txt
01/20/2011  03:59 PM            8,459 2011012015-nodes.txt
01/20/2011  03:59 PM           17,330 2011012015-service.txt
01/20/2011  04:06 PM            1,212 2011012016-cache-usage.txt
01/20/2011  04:06 PM              736 2011012016-Management.txt
01/20/2011  04:06 PM            1,675 2011012016-network-health-detail.txt
01/20/2011  04:06 PM              442 2011012016-network-health.txt
01/20/2011  04:06 PM            1,895 2011012016-nodes.txt
01/20/2011  04:06 PM            4,022 2011012016-service.txt
               12 File(s)          51,188 bytes
                0 Dir(s)  195,846,451,200 bytes free

C:\training>
```

Reporter Links

- Analyzing Reporter Data

  - http://download.oracle.com/docs/cd/E15357_01/coh.360/e15723/manage_reportercont.htm#CIHIHEHG

- Creating a Custom Report

  - http://download.oracle.com/docs/cd/E15357_01/coh.360/e15723/manage_createcustreport.htm#CIHDCCFE

Coherence JMX Reporter

- Proprietary XML

- No History

- Simple Data Management

- No Analytical Capability – No trending, history, etc

- Single Threaded, Single Timer

Questions?

Notifications

- Were added in Coherence 3.6 as support for custom platform Mbeans

- Support Notifications generated by Standard, Dynamic or 3rd party (replicated) Mbeans

- Currently only two Coherence Specific Notifications (member left, member joined.

Overview	Memory	Threads	Classes	VM Summary	MBeans

Coherence
- Cluster
  - Attributes
  - Operations
  - Notifications[3]
- Everett
- Management
- Node

Notification buffer

TimeStamp	Type	UserData	SeqNum	Message
02:57:12:929	member.joined	Member(Id=3, Timestamp=2011-01-26 02:57:12.92, Address=10.9.200.161:8090, MachineId=52129, …	3	Member 3 joined
02:57:06:973	member.left	Member(Id=2, Timestamp=2011-01-26 02:57:06.961, Address=10.9.200.161:8090, MachineId=52129,…	2	Member 2 left
02:55:51:111	member.joined	Member(Id=2, Timestamp=2011-01-26 02:55:51.098, Address=10.9.200.161:8090, MachineId=52129,…	1	Member 2 joined

Notifications Impact

- Usage Patterns

    - Point in time metric monitoring and thresh alerting

    - Event Notification

- Significantly increase the scalability of Coherence Monitoring

- Does not eliminate the need for Sampling (polling)

- Should be used with caution.

    - Over Notification can be worse than polling

- Algorithms to process and interpret the notification streams.

- Reduce the time from the incident to when the support team is notified.

Questions?

Extending Coherence with Custom MBeans

- Example Usage Patterns

  - Application Performance metrics

  - Centralizing 3rd party MBeans

  - Extending "missing" functionality

- Integrating Custom MBeans

  - Standard MBeans and Notifications are simple to implement

  - Integrating with coherence is as simple as modifying an XML file.

  - Caution should be used to avoid impacting performance with too many measures.

Extending Coherence with Custom MBeans

- Benefits of Custom MBeans

  - Provides a consolidated view of the impact of application usage on coherence resources.

  - Consolidating infrastructure component (container, etc) statistics helps spot systemic bottlenecks

  - Leverage 3rd party analytic tools for visualization and management of the system.

Questions?