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Oracle Coherence 12.1.3

Cloud Application Foundation

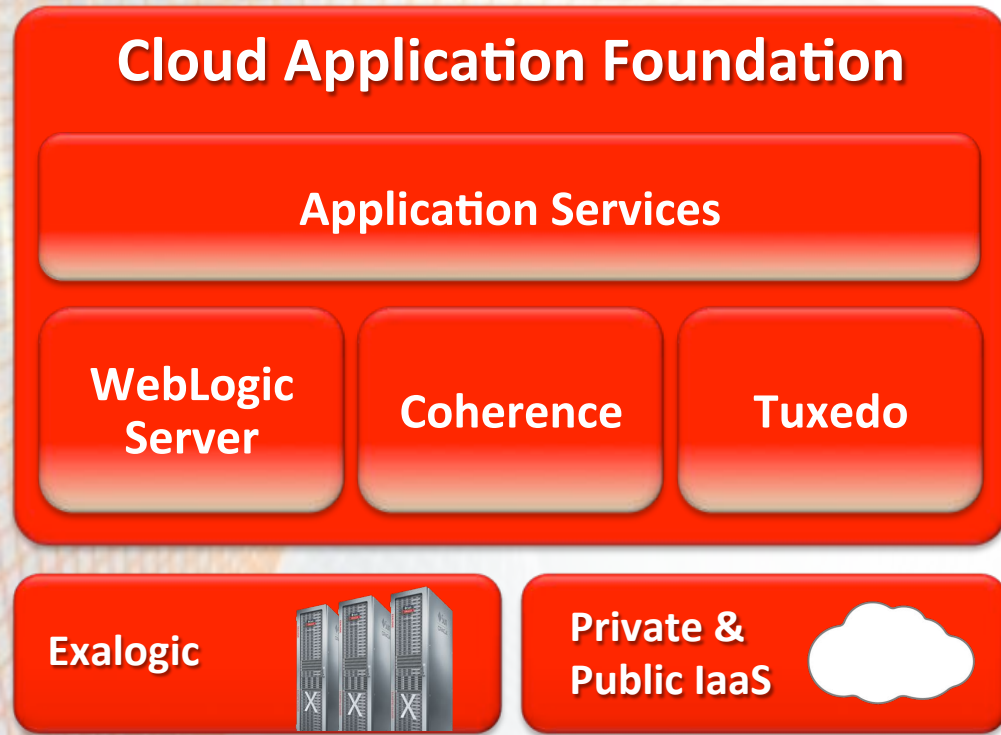
Dave Felcey
Product Management
Oracle Coherence
June, 2014

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Oracle Cloud Application Foundation



Deployment

Oracle Weblogic Server 12c

Release 12.1.3

Oracle Coherence 12c

Release 12.1.3

Oracle Tuxedo 12c

Productivity & Management

Oracle Enterprise Manager 12c

Oracle Development Tools 12c

A woman with long brown hair and glasses is sitting at a wooden desk in a bright, modern office or library. She is wearing a brown leather jacket over a blue patterned scarf. She is holding a black mobile phone to her ear with her left hand and looking down at a large document or book on the desk with her right hand. The background is slightly blurred, showing other desks and a person sitting at a desk in the distance. The overall lighting is soft and natural.

Introduction to Memcached Adaptor



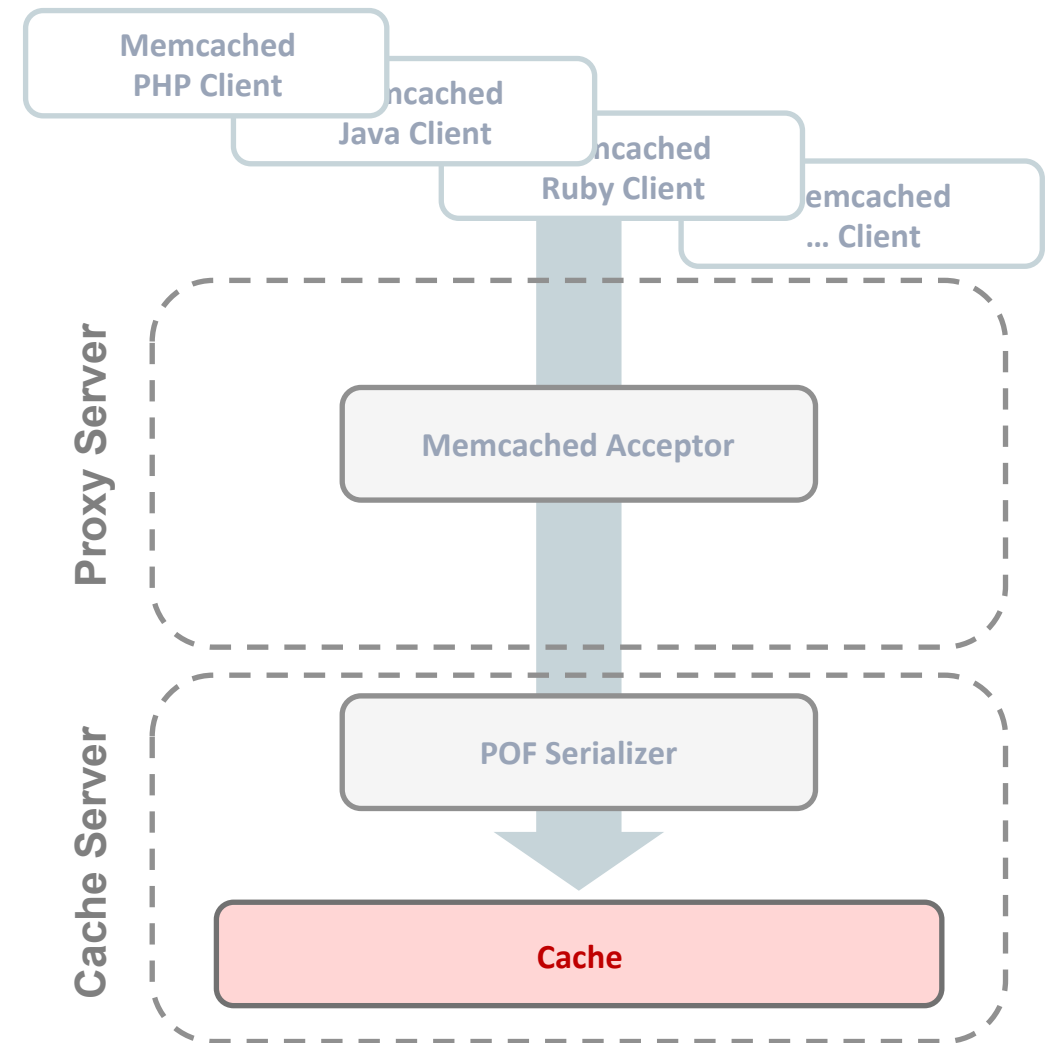
Motivation

- Allow Coherence to be a drop-in replacement for Memcached server.
- Leverage widely available Memcached client libraries to talk to Coherence from multiple languages.
- Provides an easy migration path from Memcached to Coherence.
- Take advantage of Coherence RASP features.



Memcached Adaptor

- Migrate from Memcached
- Use popular Memcached Clients
- Leverage Coherence benefits and features
 - Scalability, availability, and reliability
 - Data source integration including HotCache
 - Security
 - SASL PLAIN authentication mechanism using Coherence JAAS Identity Asserter
 - Integrates with the Coherence Proxy Security framework for custom authorization.





Implementation

- Memcached protocol support added to Coherence Proxy Service.
- Configured as an Acceptor in the proxy service similar to a tcp or http acceptor.
- Supports only memcached binary protocol.
- Access Coherence partitioned caches thru memcached clients.
- POF inter-operability between Coherence clients and memcached java clients that support pluggable serializers. (like spymemcached)

```
<proxy-scheme>
  <service-name>MemcachedProxyService</service-name>
  <acceptor-config>
    <memcached-acceptor>
      <cache-name>memcache</cache-name>
      <address-provider>
        memcached-provider
      </address-provider>
    </memcached-acceptor>
  </acceptor-config>
  <autostart>true</autostart>
</proxy-scheme>
```




Security

- Supports SASL PLAIN authentication mechanism using Coherence Identity Asserter
- Integrates with the Coherence Proxy Security framework for custom authorization.

Full-Lifecycle Monitoring and Management

DEV

OPS

JVisualVM Plugin



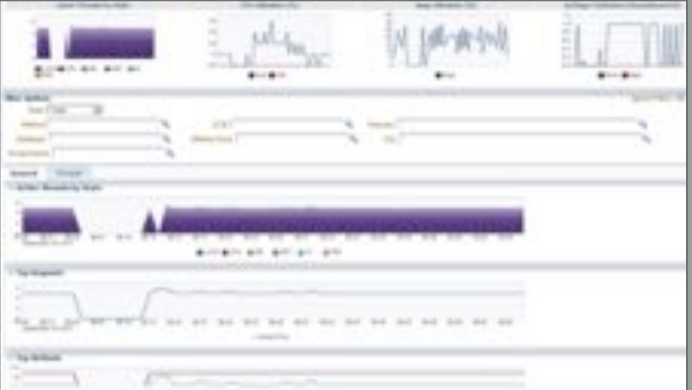
- Available now for 3.x on Coherence Community Website
- Lightweight plugin to JVM



Fusion Middleware Control

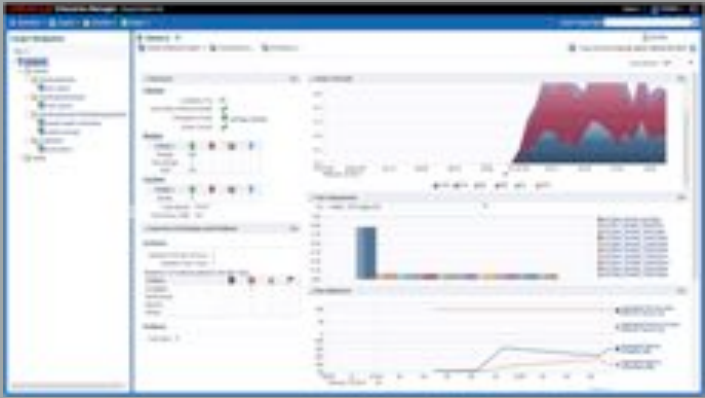


- OOTB administration and monitoring for all FMW
- Dev/QA point-in-time insight into cluster



Coherence Management Pack for OEM

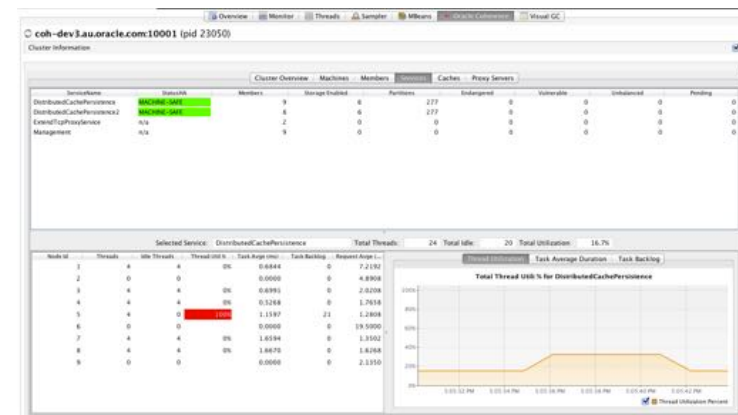
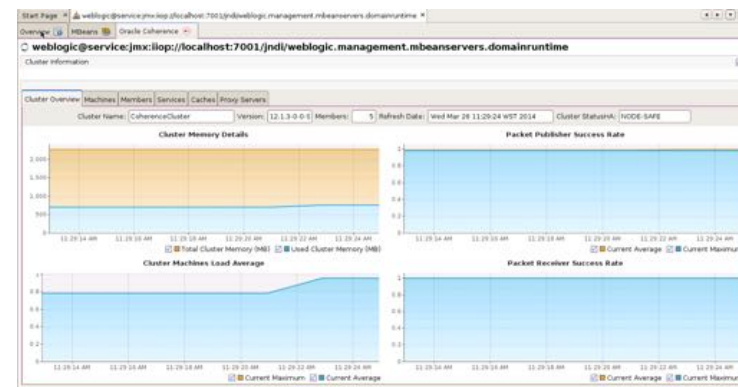
- Complete management and monitoring solution
- Store historical results
- Java diagnostics tooling





Coherence JVisualVM Plug-in Overview

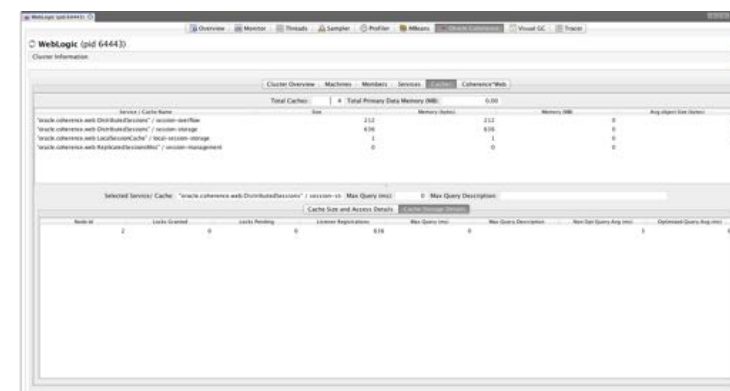
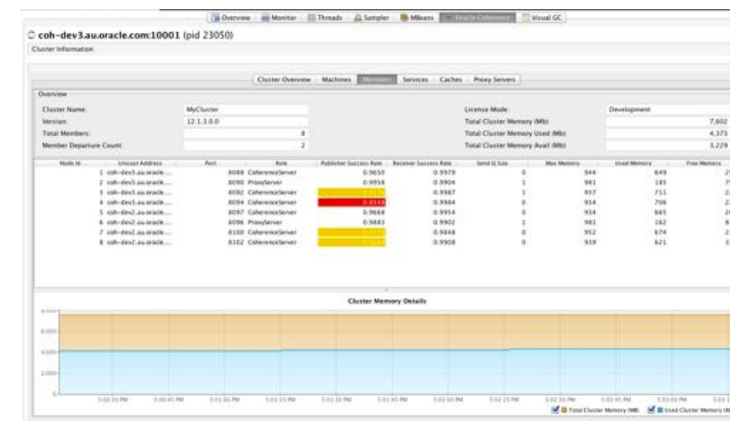
- A lightweight, developer focused plug-in for viewing general cluster information as well as aggregated Coherence MBeans
- Built as a standard NetBeans Module (NBM) utilizing the JVisualVM plug-in architecture to provide seamless integration with JVisualVM
- Information is presented in a tabular form or over time as graphs to allow real-time analysis and troubleshooting of your cluster
- Provides visual cues for pertinent information
- Supports Managed Coherence Servers (WebLogic Server) and traditional stand-alone clusters





Coherence JVisualVM Plug-in Overview

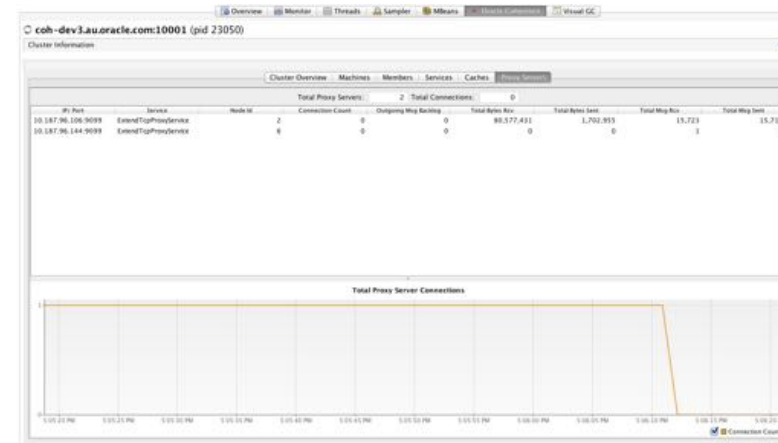
- Has been available as a community plug-in through “The Coherence Incubator”, but is now released as part of product in 12.1.3
- Displays information automatically based upon enabled functionality including:
 - General Cluster Information
 - Machines/ Nodes
 - Services
 - Caches
 - Proxy Servers
 - Coherence*Web
 - Elastic Data (available in a subsequent patch-set release)





Coherence JVisualVM Plug-in Overview

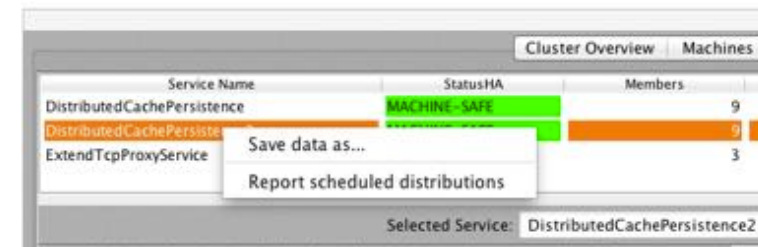
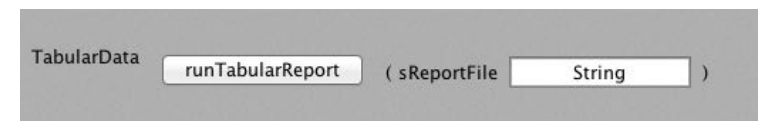
- All data tables exportable as CSV for further analysis
- Configurable data refresh rate to ensure optimal Coherence cluster performance
- Supports Coherence versions 3.5.x and above via local or remote JMX connections to Coherence MBean Server
- Drill down capabilities for Services and Caches allowing per-node view of information such as thread utilization, task and request details.
- Available from JDK 1.7 u 40 and above (can connect to some clusters running older Java versions via remote JMX connection)





Coherence 12.1.3 and Beyond

- Part of Coherence product install from 12.1.3 - available in the “plugins” directory
 `$COHERENCE_HOME/plugins/jvisualvm/coherence-jvisualvm.nbm`
- Runs on any platform supported by the JDK. e.g. Windows, OSX, Linux, Solaris, etc.
- Utilizes new “runTabularReport” capabilities of Reporter to more efficiently gather JMX statistics
- Additional “Context Sensitive” information available via right-click on selected tables. This includes operations such as “Reporting scheduled distributions for service”
- Future Plans (subject to change)
 - Supporting new features, like Recoverable Caching & Federation
 - Additional context sensitive options will become available in subsequent patch-set release





Startup Options

- After installing the plug-in, there are a number of options you can pass to the *jvisualvm* command line to configure plug-in behavior:

- Change the default time to refresh JMX statistics from 30 seconds:
(This will add additional load to the cluster)

```
-J"-Dcom.oracle.coherence.jvisualvm.refreshtime=15"
```

- Increase the timescale for each graph:
(The default is 50,000 and represents approx. 12 hours. Increasing this will increase the amount of memory used by JVisualVM)

```
-J"com.oracle.coherence.jvisualvm.values.limit=100000"
```

- Log diagnostic information regarding JMX query times:
(To view the output, choose *About* menu and choose *Log File*)

```
-J"-Dcom.oracle.coherence.jvisualvm.log.query.times=true"
```

Example (Linux/Mac/Unix):

```
jvisualvm -J"-Dcom.oracle.coherence.jvisualvm.refreshtime=15" \  
-J"-Dcom.oracle.coherence.jvisualvm.log.query.times=true"
```

Demonstration

Memecached Client Support and Visual VM Plug-in

A woman with long brown hair and glasses is sitting at a wooden table in a cafe. She is wearing a brown leather jacket over a blue patterned scarf. She is holding a black mobile phone to her ear with her right hand and looking down at a newspaper or magazine on the table with her left hand. The background is a bright, slightly blurred cafe interior with other tables and chairs.

Introduction to JCache

Introduction to JCache

- **JCache defines the standard Caching API for the Java Platform**
 - A Cache is a Map-like data-structure that may be used to temporarily store keys and values
- Developed through the Java Community Process (JCP) (see: <http://jcp.org>)
 - Drives and manages enhancement requests to the Java Platform
 - Managed by the Java Executive Committee (EC)
- JCache also commonly known by the JCP specification number: **JSR-107**

Introduction to JCache

- JCache designed and developed by industry experts
 - Specification Leads: Greg Luck, Brian Oliver, Cameron Purdy
 - Large Expert Group:
 - Oracle, IBM, Red Hat, Fujitsu, Software AG...
 - Many individuals!

Introduction to JCache

- JCache consists of several parts:
 - JCache API (API)
 - JCache Reference Implementation (RI)
 - JCache Technology Compatibility Kit (TCK)
 - JCache Specification Document (SPEC)

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Introduction to JCache

- JCache Resources:
 - Project Information and Official Downloads (API, RI, TCK, SPEC):
 - <https://jcp.org/en/jsr/detail?id=107>
 - Source Code and Issue Tracking (API, RI, TCK and DEMO)
 - <https://github.com/jsr107>
 - Forums
 - <https://groups.google.com/forum/?fromgroups#!forum/jsr107>

Introduction to JCache

– Maven API Coordinates:

- Group: `javax.cache`
- Artifact: `cache-api`
- Version: `1.0.0`

Introduction to JCache

- **Providers produce and support implementations of the JCache API**
- Some Providers produce Compliant Implementations
 - Compliant Implementations must pass the TCK
 - Others may not...
- Compliance is very important!
 - Without compliance applications developed using JCache may not be portable

Simple Example

```
//acquire a previously configured named cache
Cache<Integer, String> cache = Caching.getCache("my-cache", Integer.class, String.class);

// put something in the cache
cache.put(123, "Hello World");

// retrieve it from the cache
String message = cache.get(123);
```

The JCache API

```
/**
 * A {@link Cache} is a Map-like data structure that provides temporary storage
 * of application data.
 */
public interface Cache<K, V> extends Iterable<Cache.Entry<K, V>>, Closeable {

    V get(K key);

    Map<K, V> getAll(Set<? extends K> keys);

    boolean containsKey(K key);

    void loadAll(Set<? extends K> keys,
                boolean replaceExistingValues,
                CompletionListener completionListener);
}
```

The JCache API

```
void put(K key, V value);
```

```
V getAndPut(K key, V value);
```

```
void putAll(java.util.Map<? extends K, ? extends V> map);
```

```
boolean putIfAbsent(K key, V value);
```

```
boolean remove(K key);
```

```
boolean remove(K key, V oldValue);
```

```
V getAndRemove(K key);
```

The JCache API

```
boolean replace(K key, V oldValue, V newValue);
```

```
boolean replace(K key, V value);
```

```
V getAndReplace(K key, V value);
```

```
void removeAll(Set<? extends K> keys);
```

```
boolean remove(K key);
```

```
void removeAll();
```

```
void clear();
```

The JCache API

```
<C extends Configuration<K, V>> C getConfiguration(Class<C> clazz);
```

```
<T> T invoke(K key,  
            EntryProcessor<K, V, T> entryProcessor,  
            Object... arguments) throws EntryProcessorException;
```

```
<T> Map<K, EntryProcessorResult<T>> invokeAll(Set<? extends K> keys,  
                                             EntryProcessor<K, V, T> entryProcessor,  
                                             Object... arguments);
```

```
String getName();
```

```
CacheManager getCacheManager();
```

```
void close();
```

```
boolean isClosed();
```

The JCache API

```
<T> T unwrap(java.lang.Class<T> clazz);
```

```
void registerCacheEntryListener(CacheEntryListenerConfiguration<K, V> configuration);
```

```
void deregisterCacheEntryListener(CacheEntryListenerConfiguration<K, V> configuration);
```

Introduction to JCache

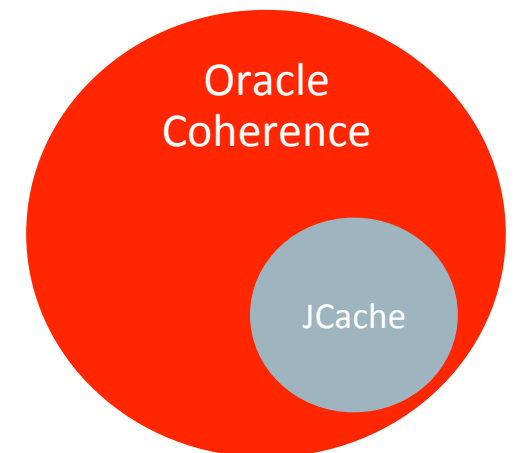
– There's actually a lot more to JCache

- Support for Multiple Named Caches
- Support for Multiple Caching Providers
- Support for Annotation-based Caching (when using Compliant Containers)
- Support for JMX-based Monitoring

– The specification document contains a detailed overview

Getting Started with JCache and Coherence

- Oracle Coherence 12.1.3 is a **compliant** JCache Provider
 - Supports all JCache APIs and configurations
 - Additionally numerous compliant Caching Topologies (eg: local and partitioned/distributed)
 - Provides “pass-through” configurations to support accessing existing Coherence-native Caches as JCache Caches
- “Essentially JCache is a sub-set of Oracle Coherence”



Getting Started with JCache and Coherence

– Step 1: Application Dependencies and Class Path Requirements

- cache-api.jar (The JCache API)
- coherence.jar (Oracle Coherence)
- coherence-jcache.jar (Provides Oracle Coherence JCache Support)

Getting Started with JCache and Coherence

– Step 2: Configuring JCache for use with Coherence

- All applications must specify a Coherence Cache Configuration that enables JCache

- Approach 1: Use the example Coherence Cache Configuration for JCache

```
-Dtangosol.coherence.cacheconfig=coherence-jcache-cache-config.xml
```

- Approach 2: Introduce the JCache Namespace into an existing Coherence Cache Configuration

```
<cache-config ...  
  xmlns:jcache="class://com.tangosol.coherence.jcache.JCacheNamespace">
```

Getting Started with JCache and Coherence

– Step 3: Acquire a Cache Manager from the Caching Provider

```
// acquire the default CachingProvider
CachingProvider provider = Caching.getCachingProvider();

// acquire the default CacheManager
CacheManager manager = provider.getCacheManager();
```

Getting Started with JCache and Coherence

– Step 4: Configure JCache Caches

```
// define a standard JCache Cache Configuration
MutableConfiguration<String, Integer> config = new MutableConfiguration<>();

config.setStoreByValue(true)
    .setTypes(String.class, Integer.class);

// create the cache
Cache<String, Integer> cache = manager.createCache("Ages", config);
```

Getting Started with JCache and Coherence

– Step 5: Use JCache Caches

```
// acquire a previously configured named cache
Cache<String, Integer> ages = manager.getCache("Ages", String.class, Integer.class);

// put values into the cache
ages.put("Talker", 132);
ages.put("Tonto", 2);

// retrieve a value from the cache
int age = ages.get("Tonto");
```

Comparison of JCache and NamedCache Features

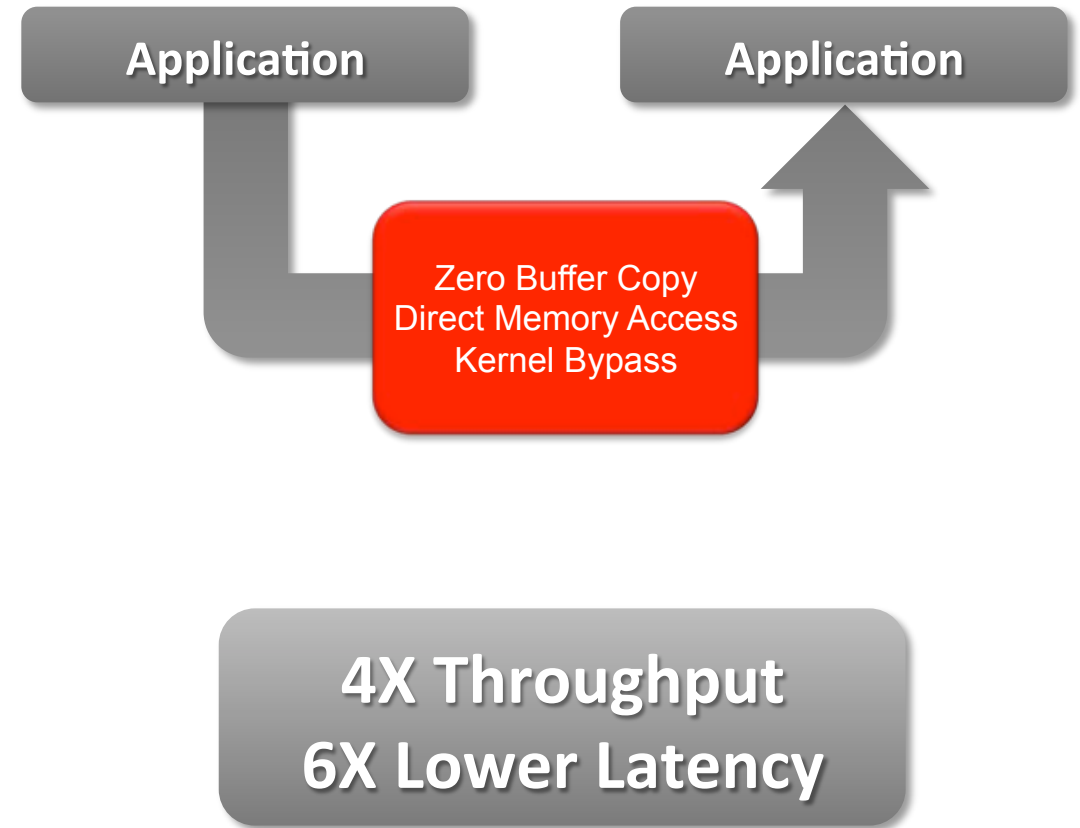
Feature	JCache	NamedCache
Local Cache	X	X
Partitioned (Distributed) Cache	X	X
Replicated Cache		X
Optimistic Cache		X
Near Cache		X
Read Through	X	X
Write Through	X	X
Events	X	X
Query Filters		X
Indexes		X
Entry Processors	X	X
Aggregation		X

More Information

- Oracle Coherence JCache Information:
 - Consult the “Developing Applications with Oracle Coherence” Book
 - <http://www.oracle.com/technetwork/middleware/coherence/overview/index.html>

Infiniband Message Bus 2.0

- Second generation implementation of the Infiniband MessageBus API for Exalogic
- MQL libraries shared with database and eventually other products
 - Leverages support and tuning investment across ExaData and ExaLogic platforms, and other product suites
- More latency and scalability improvements



Functionality Improvements



- Added SSL support for reliable transport tmb and sdmb.
- Asynchronous EntryProcessors
 - Better control over parallel execution of EntryProcessors without need to create new threads.
- Elastic Data Eviction Support via high/low watermark
- Async index creation
 - Reduce Mean Time To Recovery by rebuilding the index data structures after partition transfer. Note: any requests dependent on indices will not execute until the indices are rebuilt.
- Added a custom index implementation to avoid repetitive value deserialization.
 - See Javadoc for `com.tangosol.util.extractor.DeserializationAccelerator` class.



Ease of Use Improvements

- Enhanced NameService so it runs on all cluster nodes (backported to 12.1.2.0.1)
 - Removes requirement to start proxy servers before cache servers on a given machine.
 - <http://coherencedownunder.wordpress.com/2014/03/21/using-the-nameservice-in-coherence-12-1-2/>



Compatibility Improvements

- Extend clients support both forward and backward compatibility with cluster proxies.
 - That is, extend clients can connect to cluster proxies that have lower or higher version numbers (within a major release).
 - For example, a 12.1.3 extend client can connect to a 12.1.2.0.1 proxy.
 - Extend client backward compatibility is not supported on proxy versions prior to 12.1.2.0.1, including 12.1.2.0.0 and proxy versions 3.7.1 or earlier.

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