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Oracle Coherence 12.1.3

Cloud Application Foundation

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Product Management
Oracle Coherence
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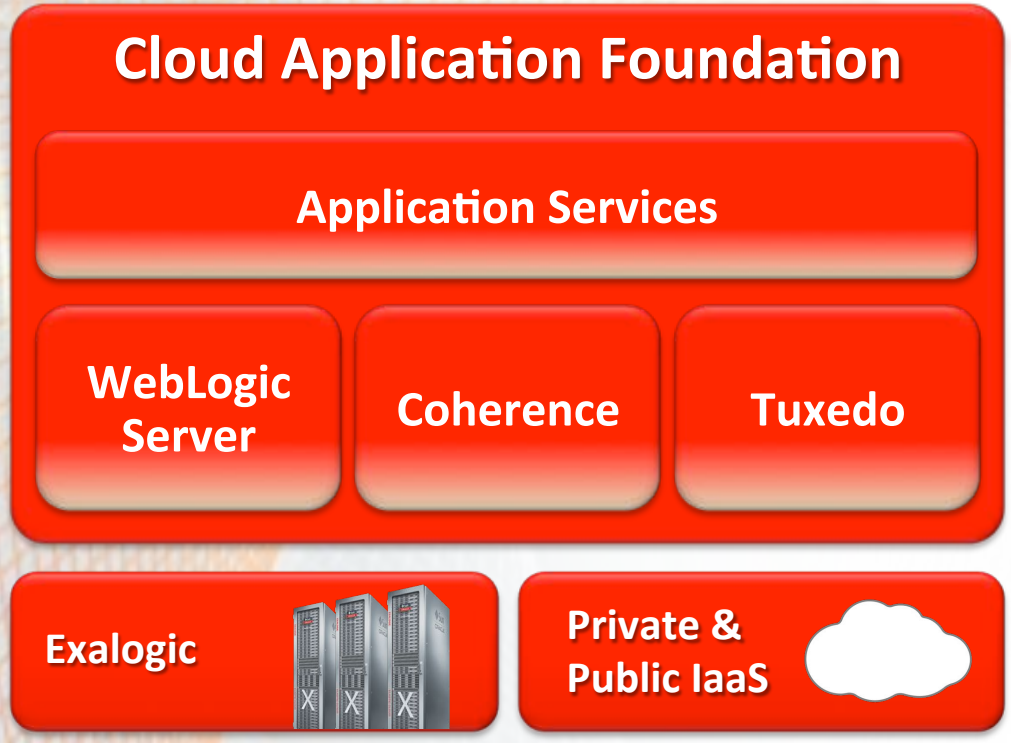
Oracle Cloud Application Foundation



Deployment

Oracle Weblogic Server 12*c*

Release 12.1.3

Oracle Coherence 12*c*

Release 12.1.3

Oracle Tuxedo 12*c*

Productivity & Management

Oracle Enterprise Manager 12*c*

Oracle Development Tools 12*c*

Introduction to Memcached Adaptor

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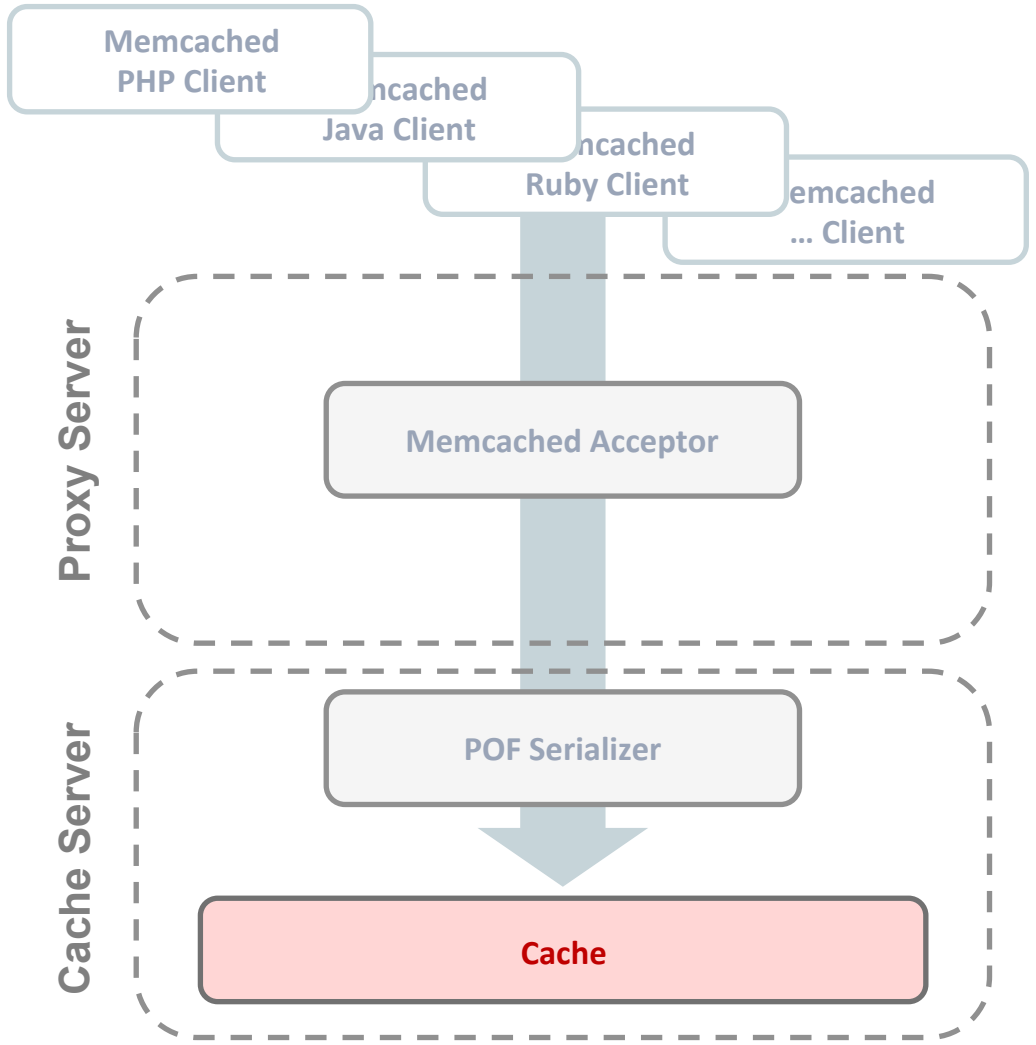
Motivation

- 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

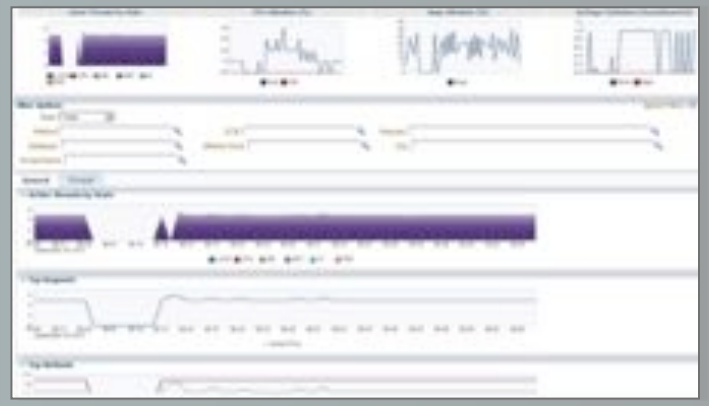
NEW

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

Fusion Middleware Control

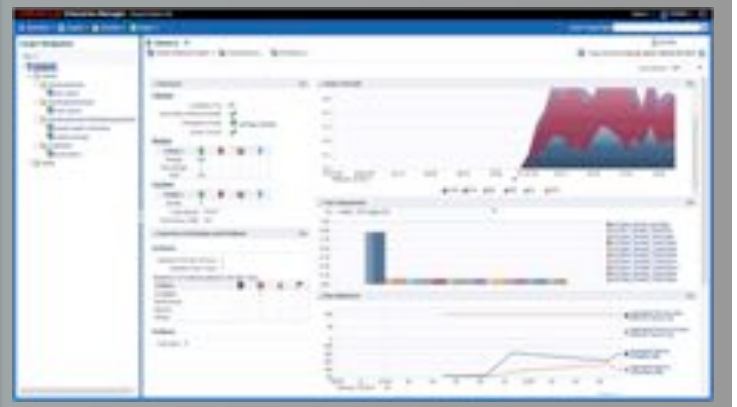
COMING SOON

- 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



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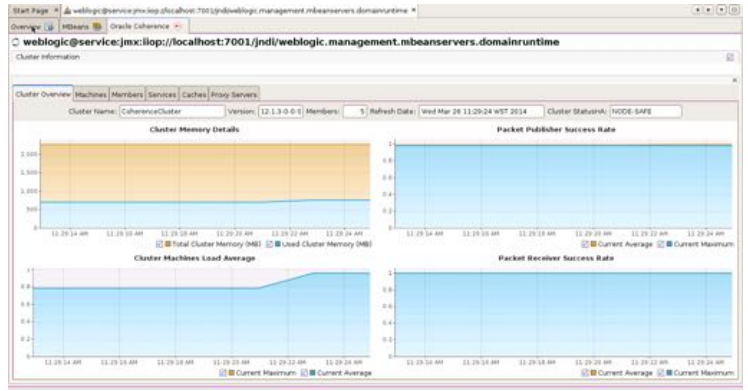
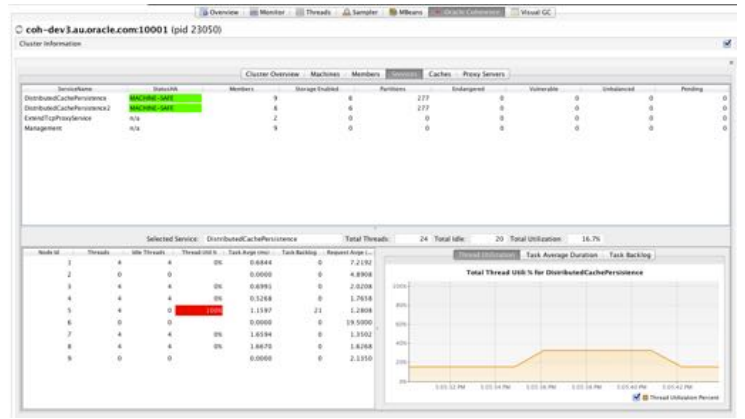
Coherence JVisualVM Plug-in Overview

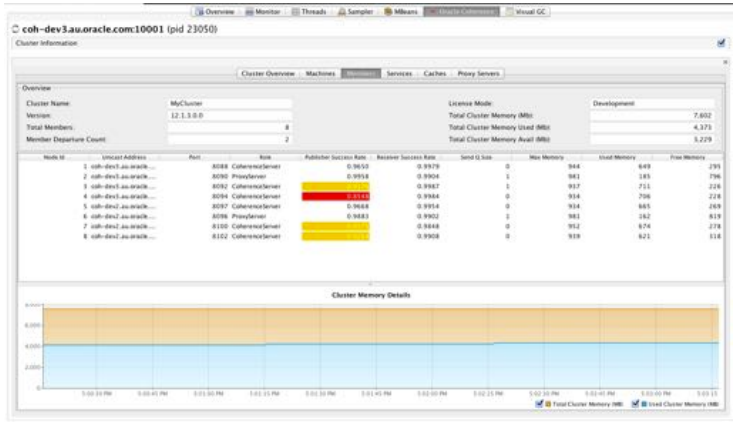
- A lightweight, developer focused plug-in for viewing general cluster information as well as aggregated Coherence MBeans
- Built as a standard NetBeans Module (NBM) utilizing the JVisualVM plug-in architecture to provide seamless integration with JVisualVM
- Information is presented in a tabular form 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

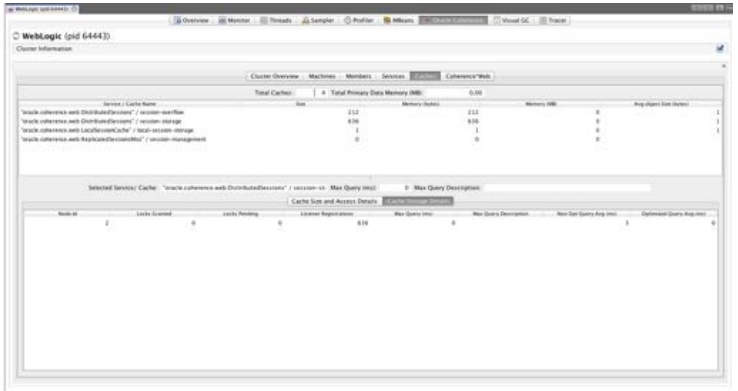




Coherence JVisualVM Plug-in Overview

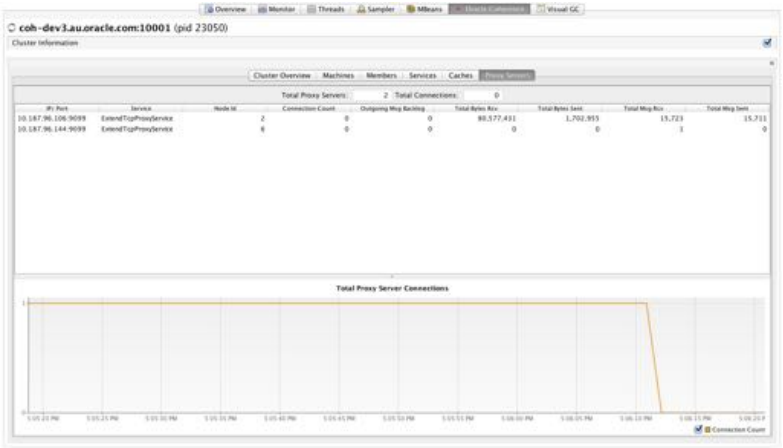
- Has been available as a community plug-in through “The Coherence Incubator”, but is now released as part of product in 12.1.3
- Displays information automatically based upon enabled functionality including:
  - General Cluster Information
  - Machines/ Nodes
  - Services
  - Caches
  - Proxy Servers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





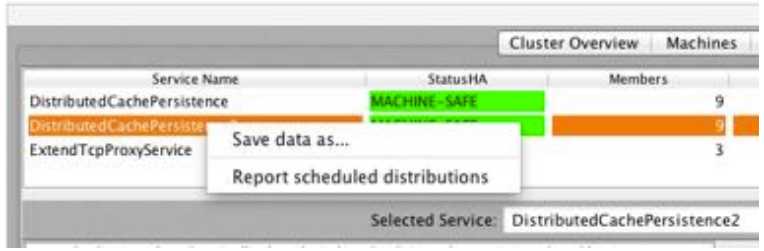
Coherence JVisualVM Plug-in Overview

- 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

Introduction to JCache

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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)

Introduction to JCache

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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

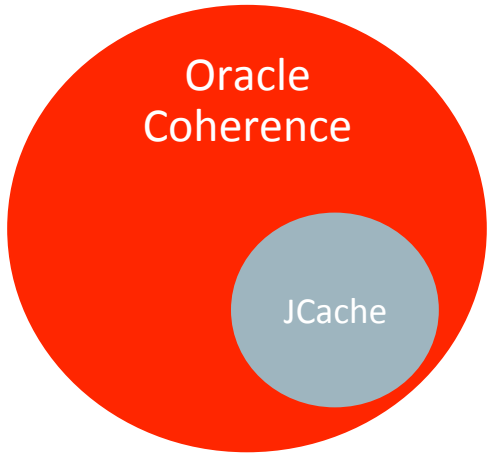
```
<T> T unwrap(java.lang.Class<T> clazz);

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

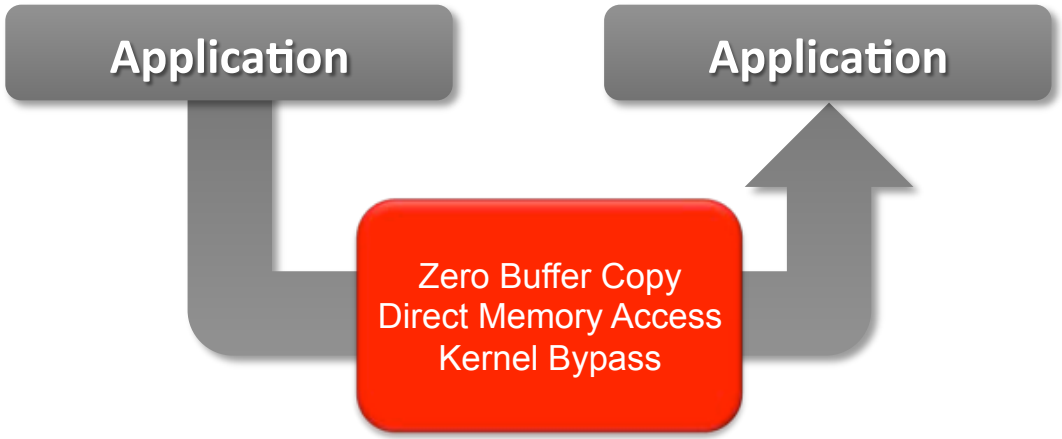
Feature	JCache	NamedCache
Local Cache	X	X
Partitioned (Distributed) Cache	X	X
Replicated Cache		X
Optimistic Cache		X
Near Cache		X
Read Through	X	X
Write Through	X	X
Events	X	X
Query Filters		X
Indexes		X
Entry Processors	X	X
Aggregation		X

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



4X Throughput
6X Lower Latency

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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