In-Memory Grid Computing und Java EE

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Java Application Server Plattform Community

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Registrierung: https://www.xing.com/net/oraclejavaappserver
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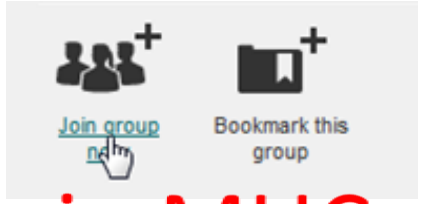

Coherence und WebLogic SIG, 4.Nov in MUC

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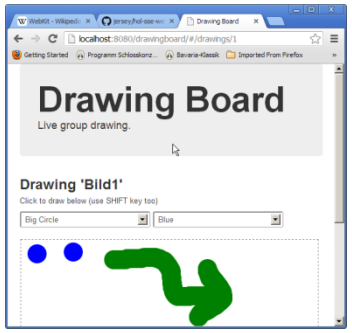
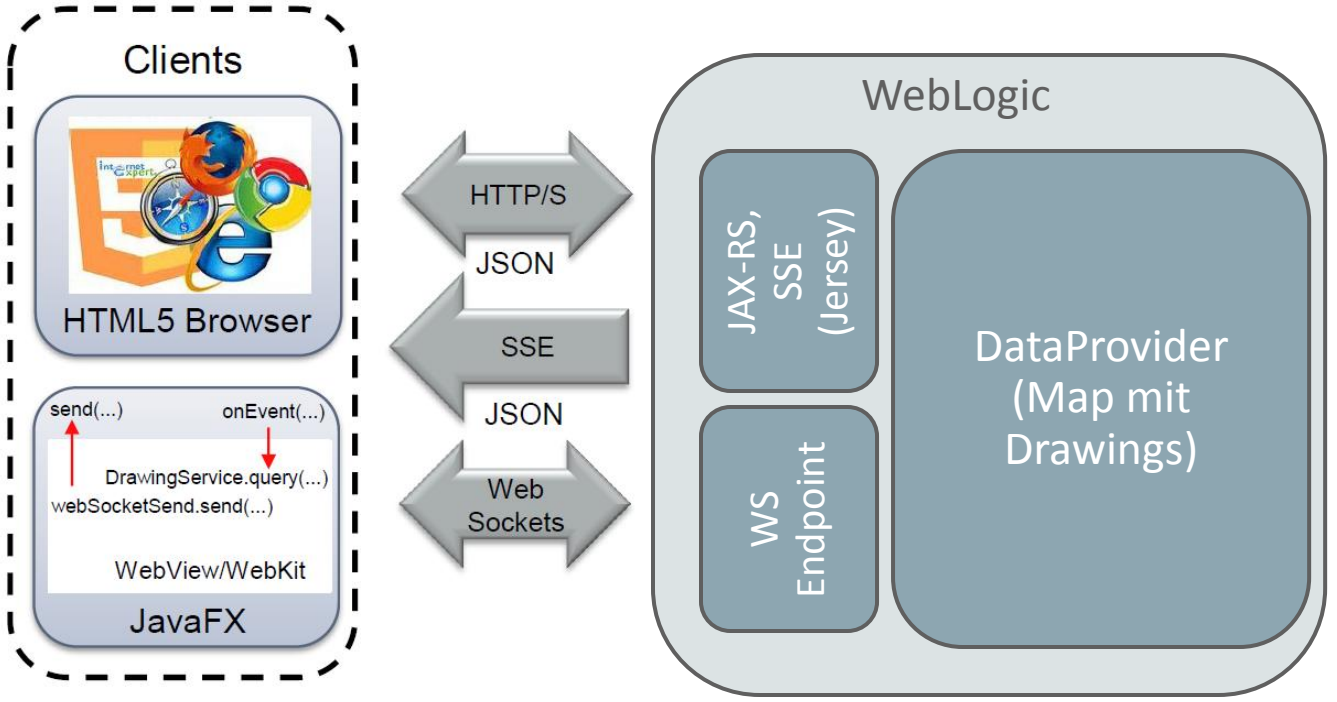
Agenda

- Status Quo: Zustand in verteilten Java EE Umgebungen
- In-Memory Grid Computing und Java EE mit Oracle Coherence

Serverseitiger Zustand in modernen Java EE Anwendungen

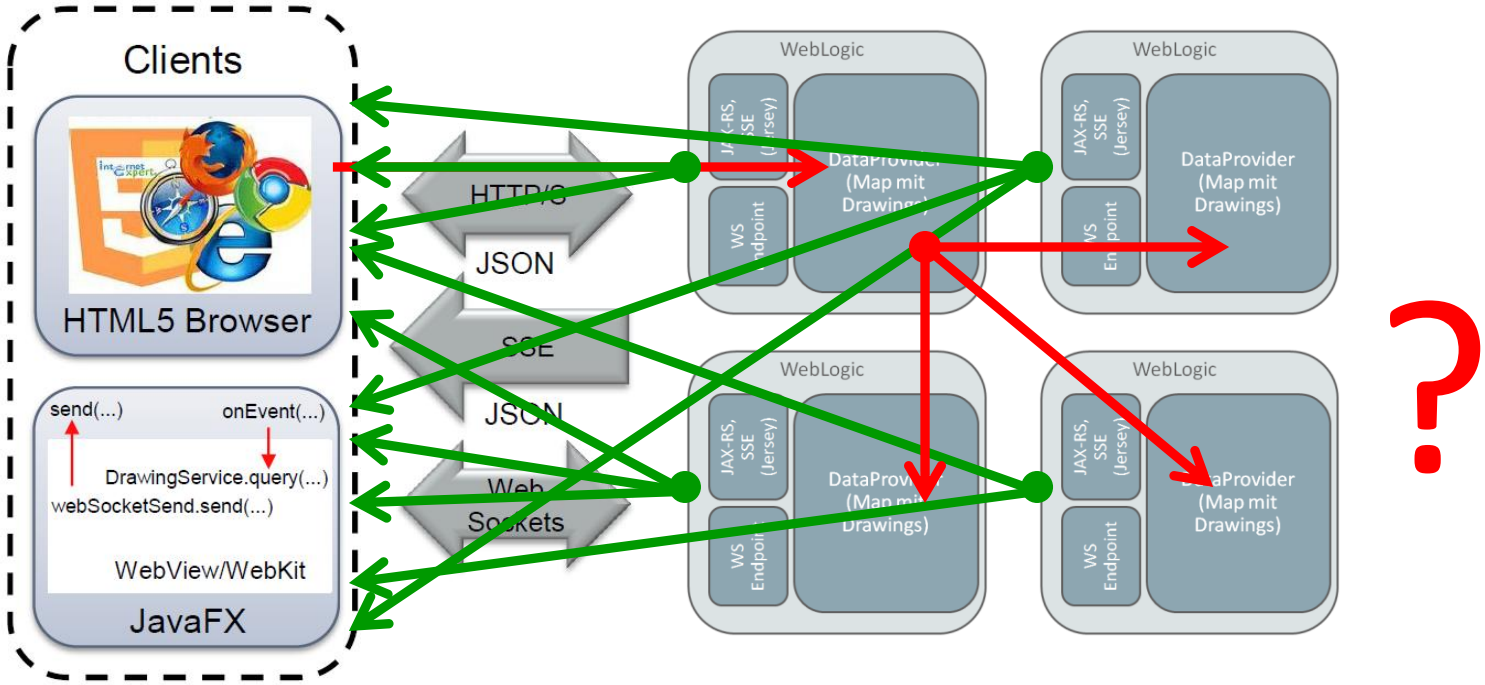
- Beispiel Drawingboard (https://github.com/doschkinow/hol-sse-websocket):
  - Client: HTML5 (angular.js)
  - Server: JAX-RS 2.0 (JSR- 339) und SSE, Websockets 1.0 (JSR-356), u.a.



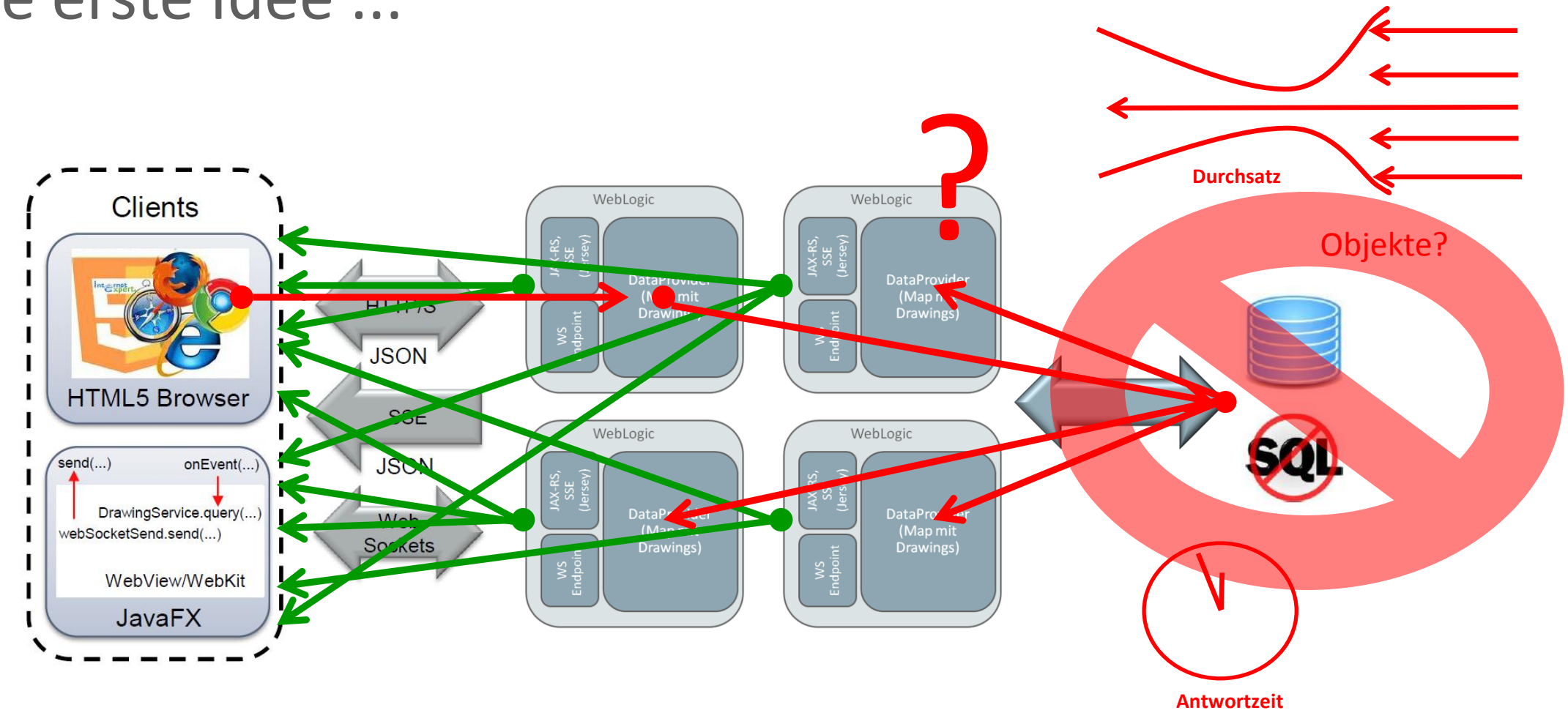


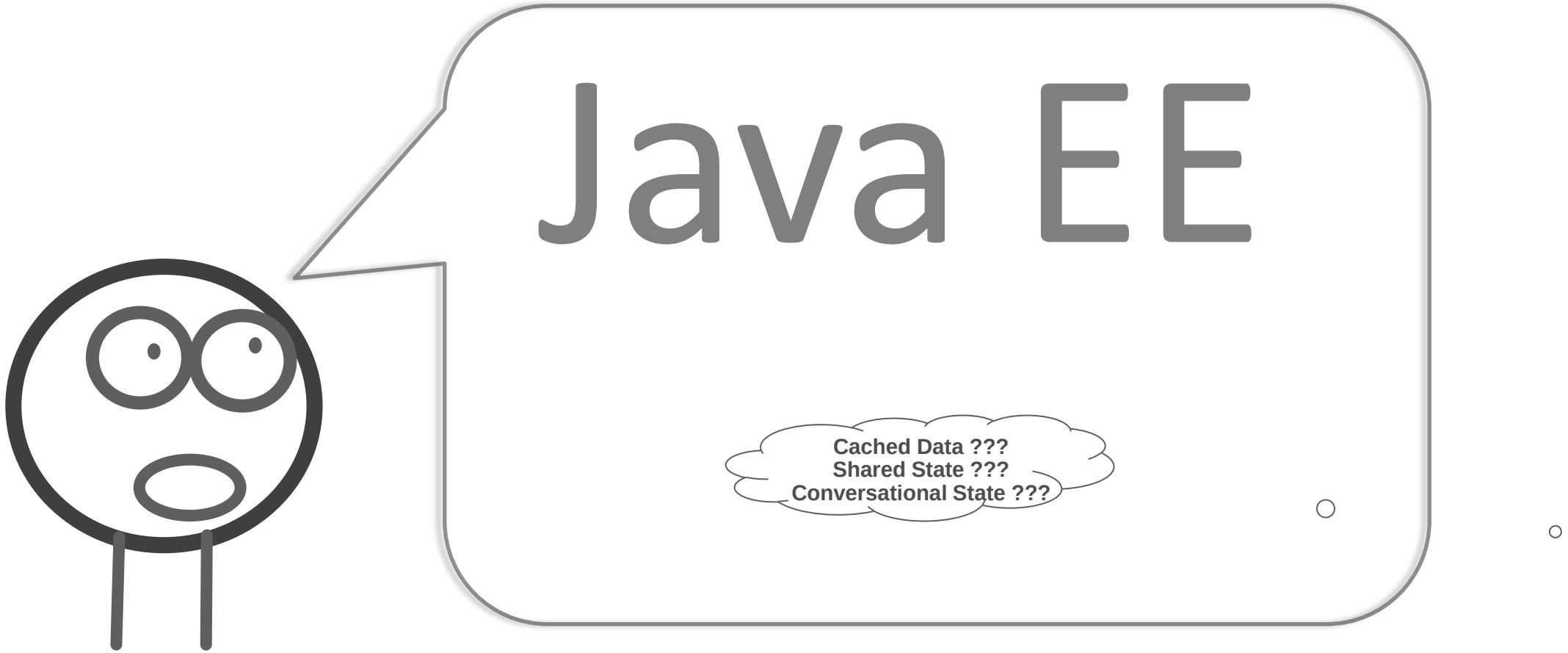
Java EE

Zustand, der in verschiedenen JVMs gebraucht wird



Eine erste Idee …





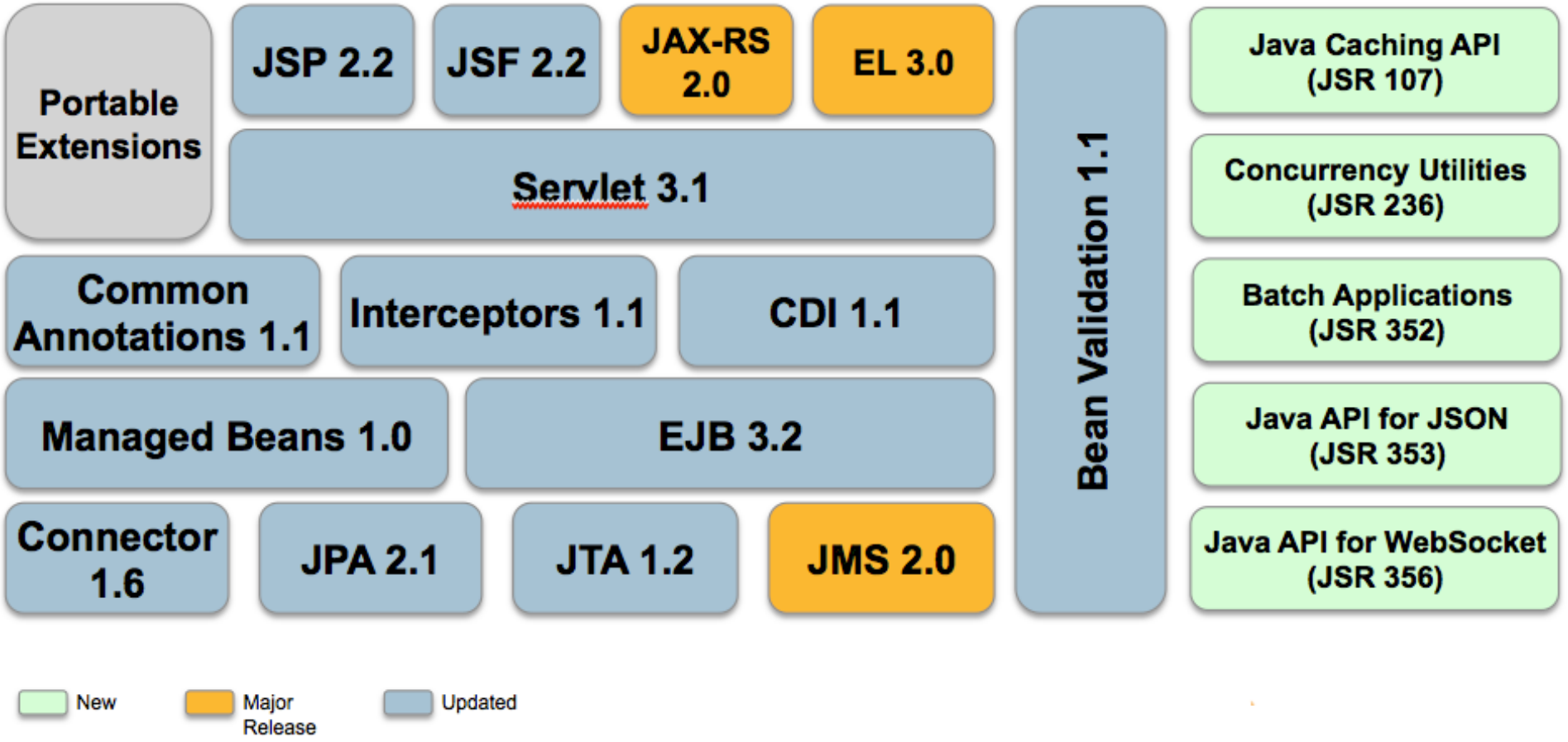
Java EE 7 Fokus

- More annotated POJOs
- Less boilerplate code
- Cohesive integrated platform

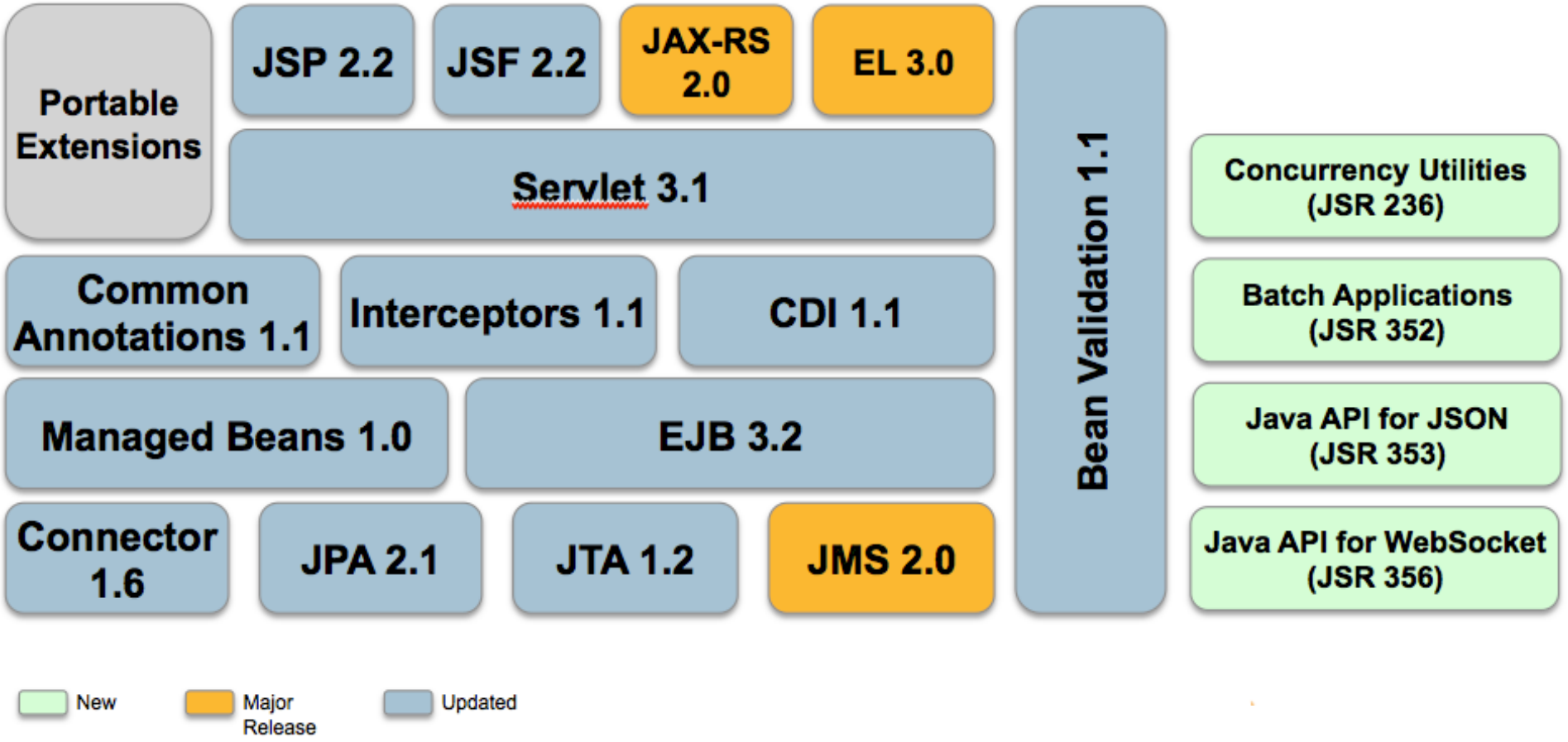
- WebSockets
- JSON
- Servlet 3.1 NIO
- REST

- Batch
- Concurrency
- Simplified JMS

Java EE 7 JSRs – Prefinal

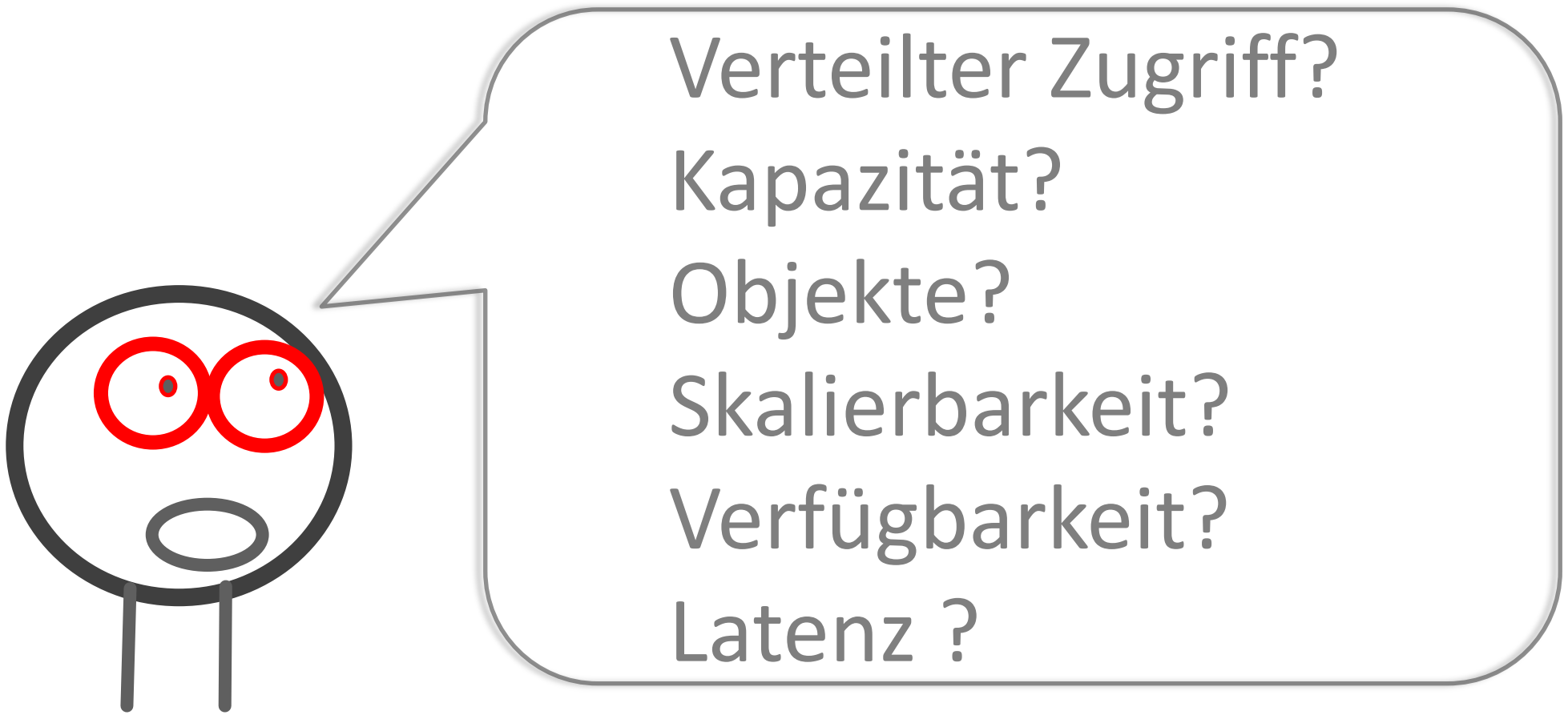


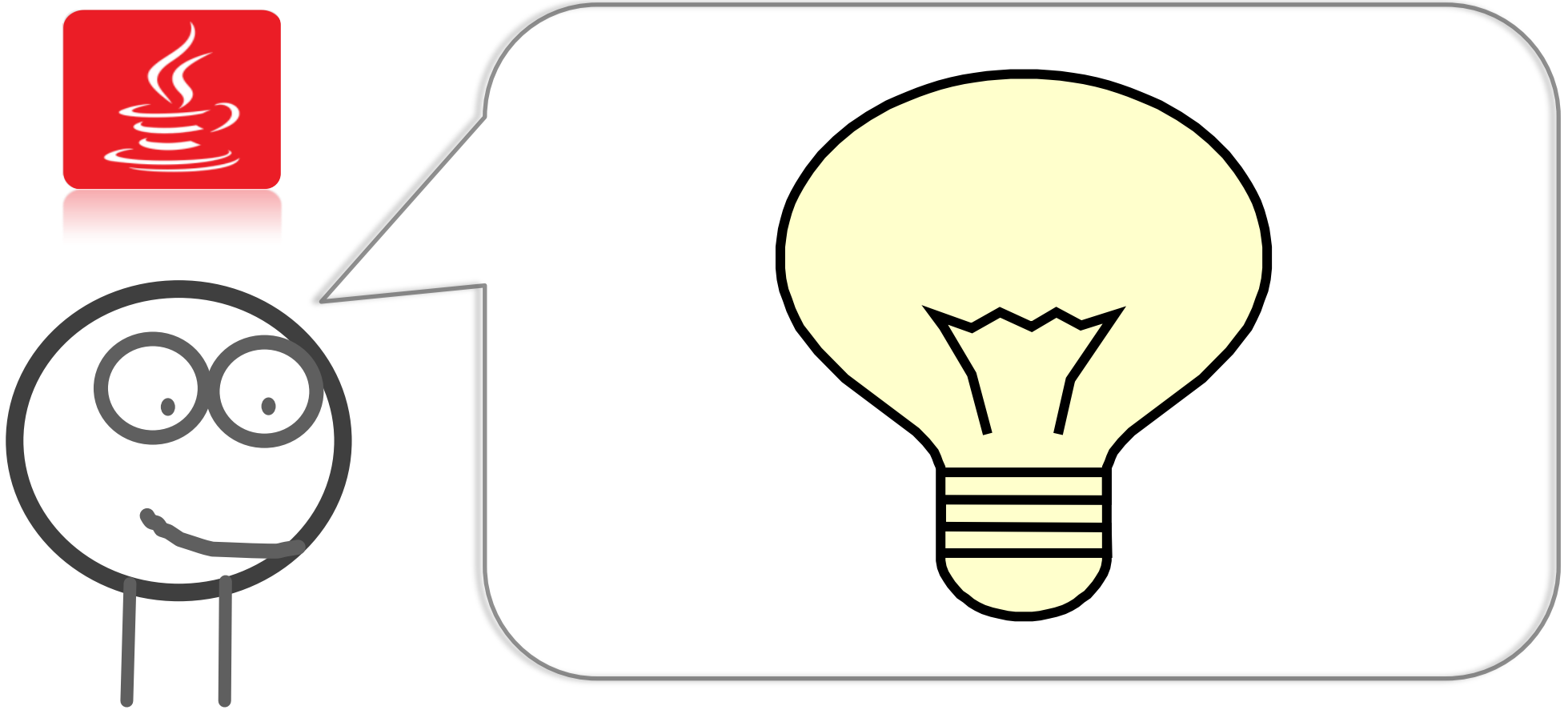
Java EE 7 JSRs – Final



Status Quo: Zustand in der Java EE Welt

- JSR für Caching innerhalb von Java EE?
  - Frühjahr 2014
    - Finalisierung JSR-107: Caching in Java SE
    - Keine Aussagen über Zusammenarbeit mit Java EE → Java EE 8 (?)
- JSR für Java Grid Computing (was passiert in JSR-347: „Data Grids for the Java Plattform“)?





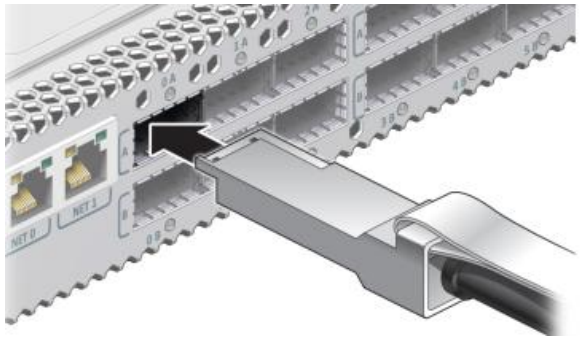
In-Memory Data Grid*

* angelehnt an http://www.jroller.com/cpurdy/entry/defining_a_data_grid

- In-Memory basiertes Management System für verteilt genutzte Objekte mit
  - geringen Antwortzeiten
  - hohem Duchsatz
  - vorhersehbarer Skalierbarkeit
  - Fehlertoleranz: Verfügbarkeit und Zuverlässigkeit.

Anforderungen/Herausforderungen

- Hohe Kapazitäten: TBs
  - In-Memory: On-Heap
  - alternative Medien: SSDs, Flash
  - Schnelles Netzwerk (!!)

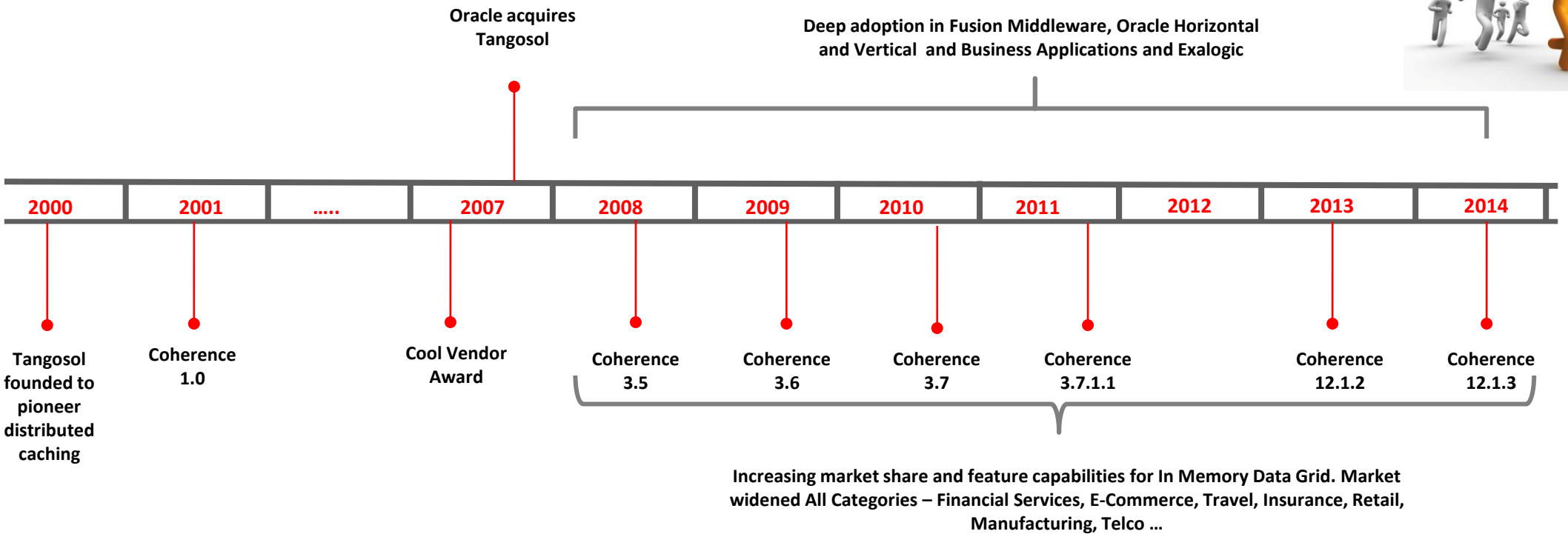


- Verteiltes Rechnen: Datenmanagement und parallele, auch asynchrone Verarbeitung, z.B. mittels EntryProzessor, Filter, Aggregationen
- Integration in Java SE und Java EE Umgebungen
- Vielseitiger Clientzugriff: Java, C++, .Net, REST, memcached
- Wie serialisieren?

Anforderungen/Herausforderungen

- Integration mit persistenten Systemen (Vermeidung Stale Cache Problem)
- Einfache Konfiguration, Administration und Monitoring vieler JVMs

Pionier im Bereich Java In-Memory Data Grid Computing



Coherence in a Nutshell

- Coherence-Knoten:
  - Java Knoten:(Non-)Storage Knoten und optional Proxy-Knoten: XML-Konfigurationen und Bibliotheken im Klassenpfad
  - C++, .NET, REST, memcached Zugriff mittels Proxy-Knoten.
- Storageknoten können Daten aufnehmen/verwalten, spezielle Serialisierungsmechanismen sind möglich (POF), Evolvable
- Sehr effiziente Protokolle für Clusterkommunikation (TCMP)
- APIs:
  - Coherence spezifische APIs: NamedCache API (= Map<K,V> ähnliche Datenstruktur)
  - JCache API (JSR-107)

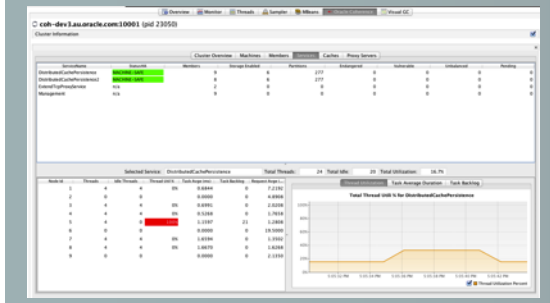
Coherence in a Nutshell

- Alle IDEs
- Builds mit Maven
- Konfiguration over Default
  - XML
  - Java System Properties
- Management mit JMX
  - JVisualVM Plug-In
  - Oracle Enterprise Manager Cloud Control und 3rd Party

JVisualVM Plugin

NEW

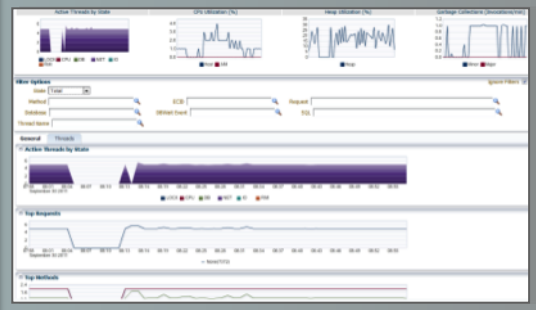
- Available now for 3.x on Coherence Community Website
- Lightweight plugin to JVM



Fusion Middleware Control

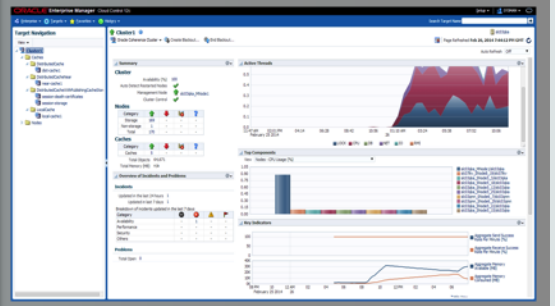
- OOTB administration and monitoring for all FMW
- Dev/QA point-in-time insight into cluster

NEW

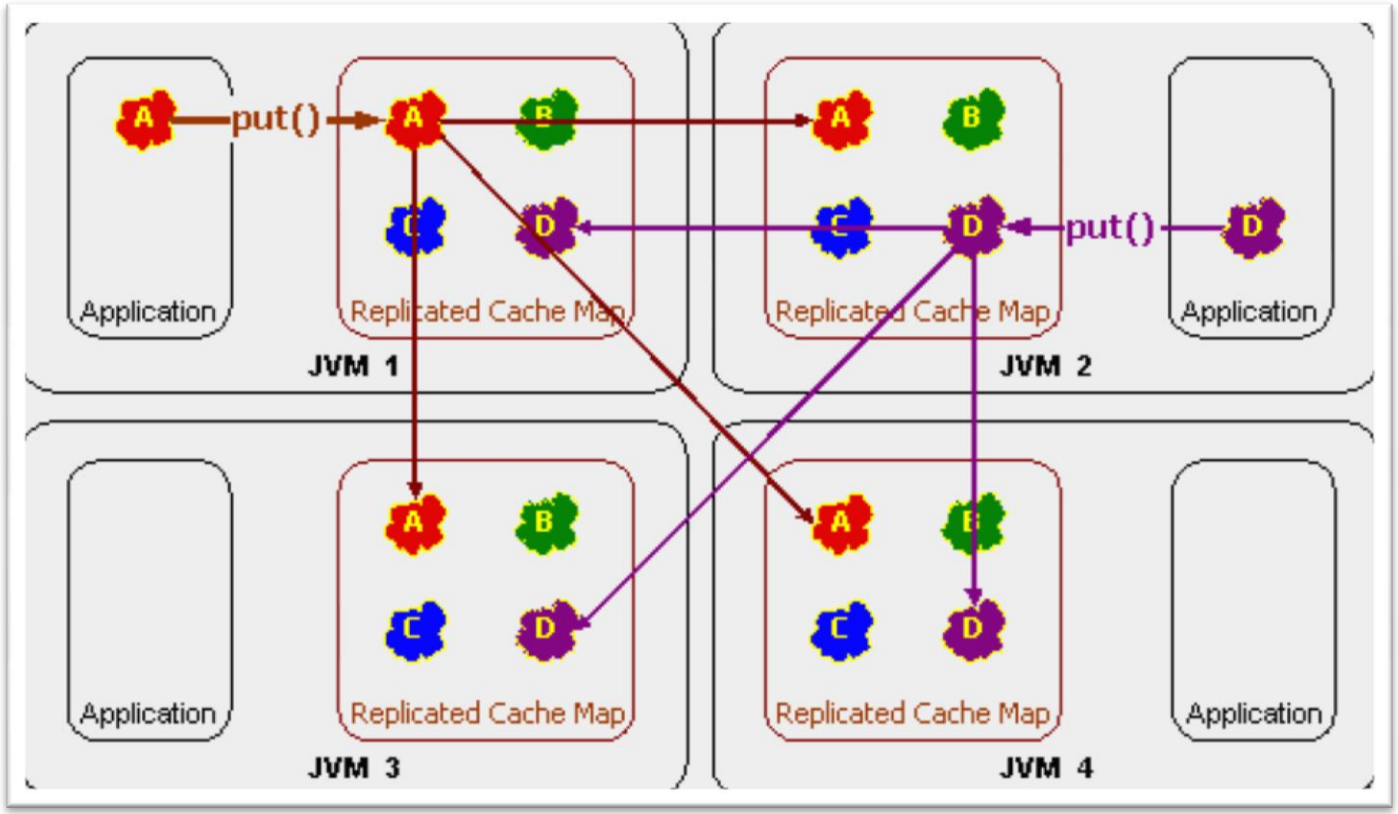


Coherence Management Pack for OEM

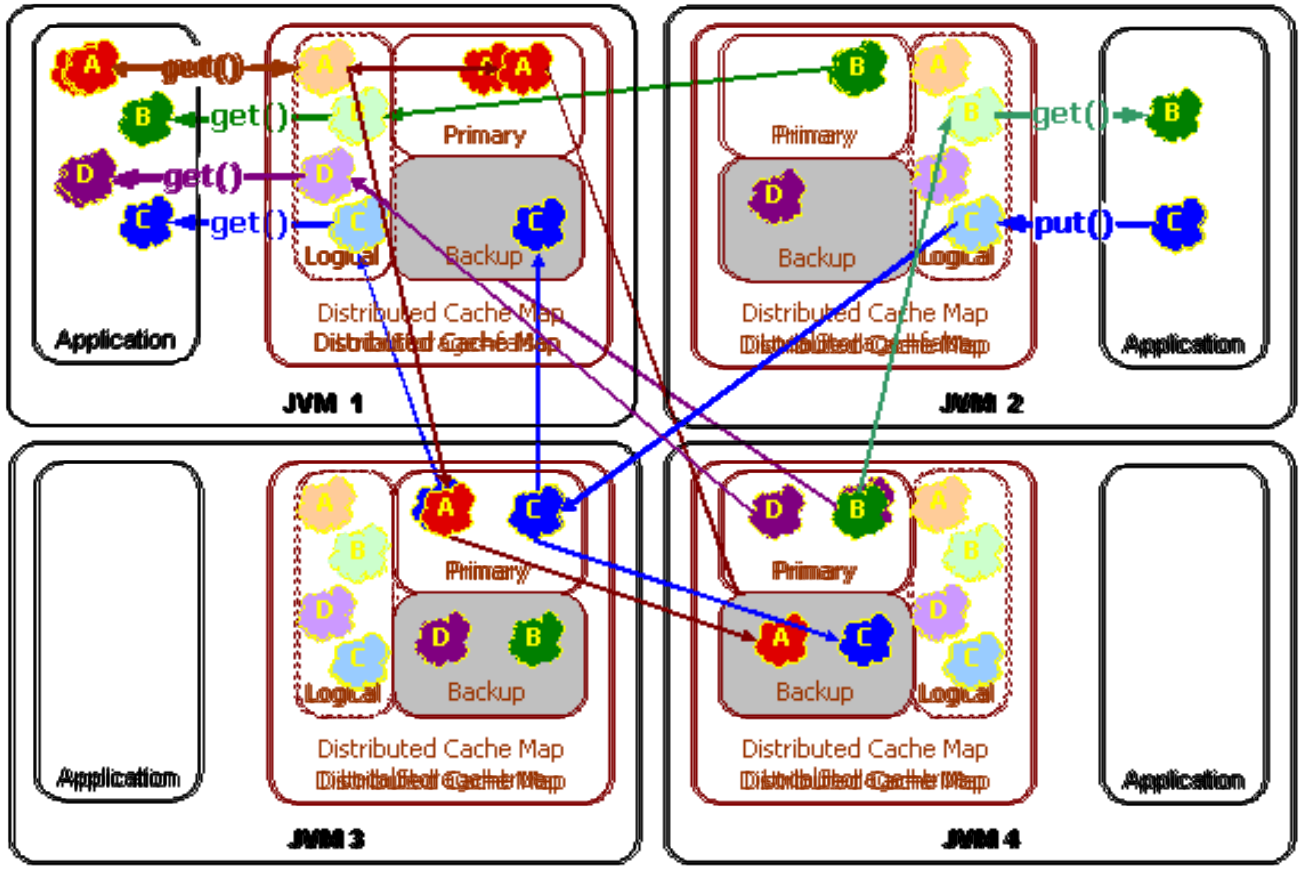
- Complete management and monitoring solution
- Store historical results
- Java diagnostics tooling



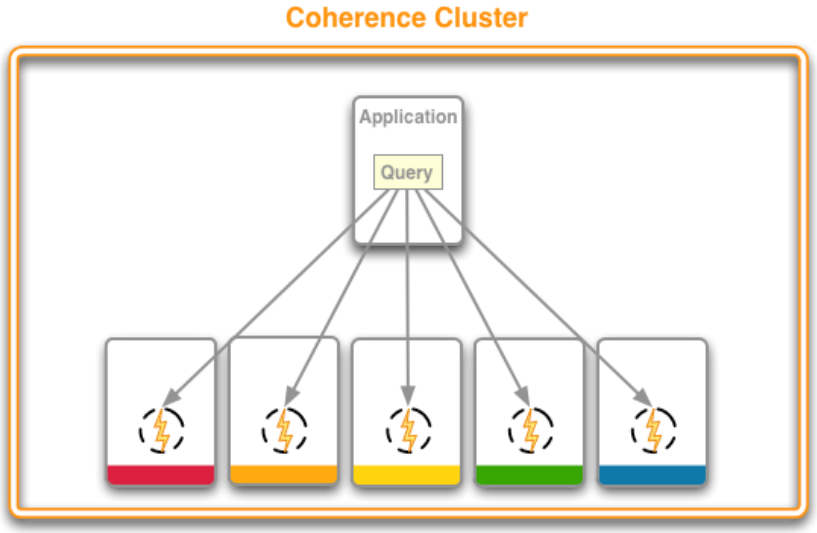
Coherence in a Nutshell

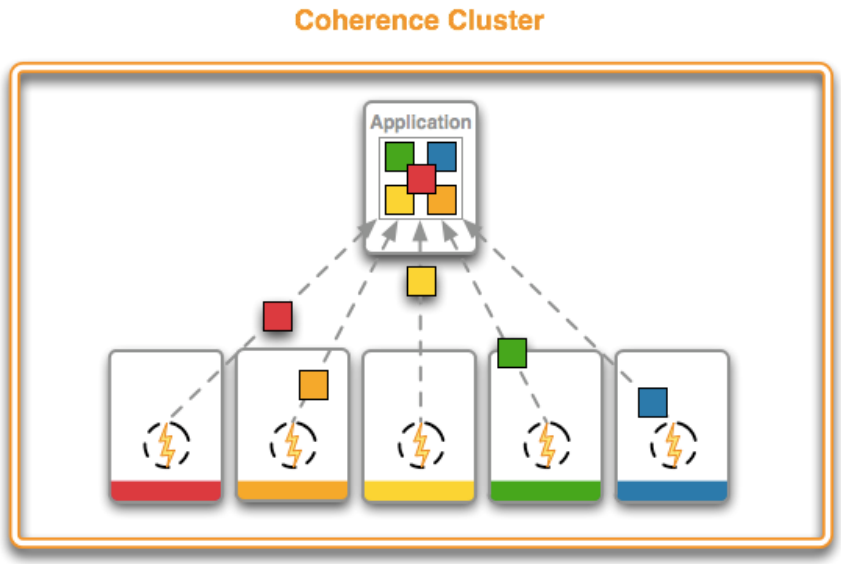


Coherence in a Nutshell



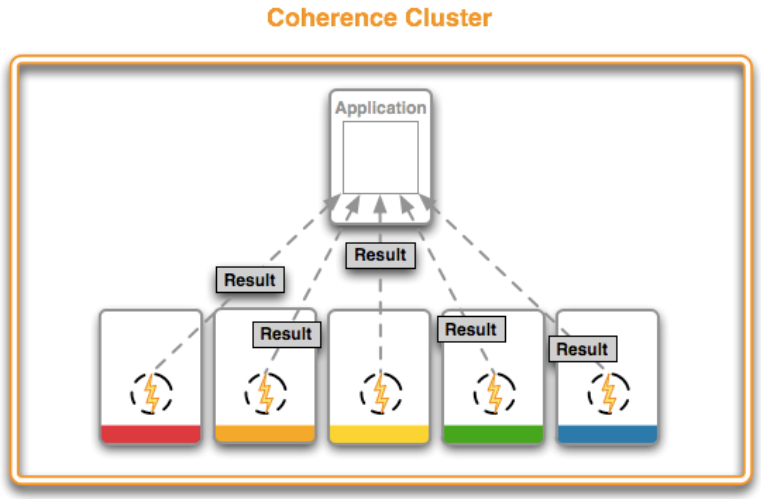
Coherence in a Nutshell





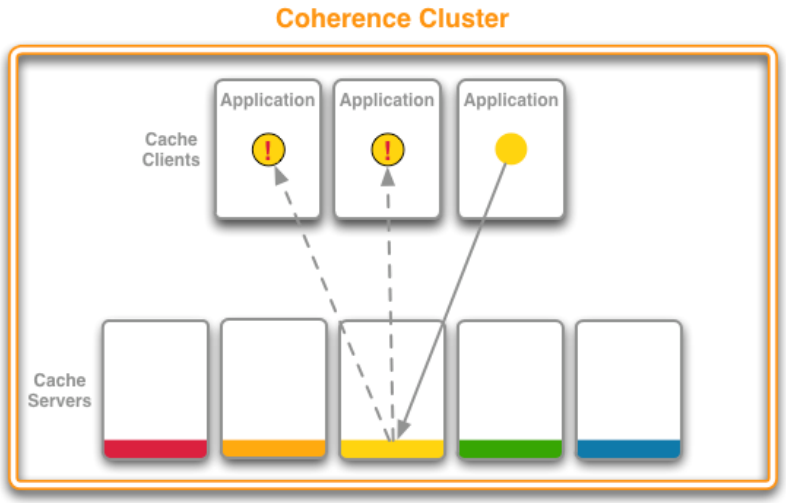
Parallele Verarbeitung: Filter mit Indizes, Aggregationen

Coherence in a Nutshell



Parallele Verabeitung: synchrone und asynchrone Entryprozessoren
Bringe Code zu Verabeitungsknoten und nicht Daten in den Client

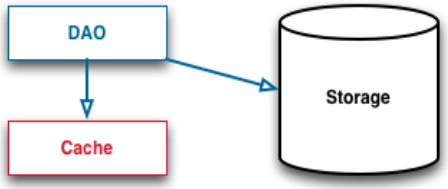
Coherence in a Nutshell



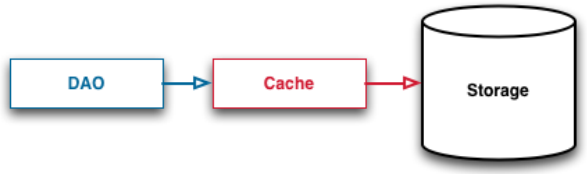
Map Events: entryInserted, entryUpdated, entryDeleted
Live Events: Partitioned Cache Events, Partitioned Service Events, Lifecycle Events, …

Coherence in a Nutshell

Cache Aside

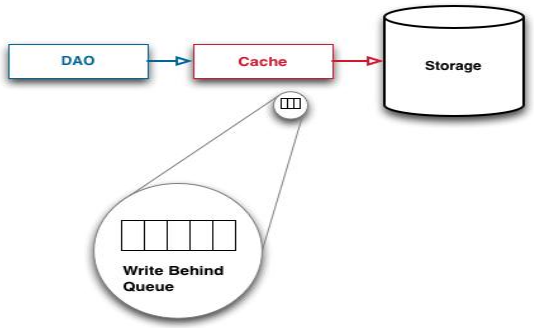


Write-Through

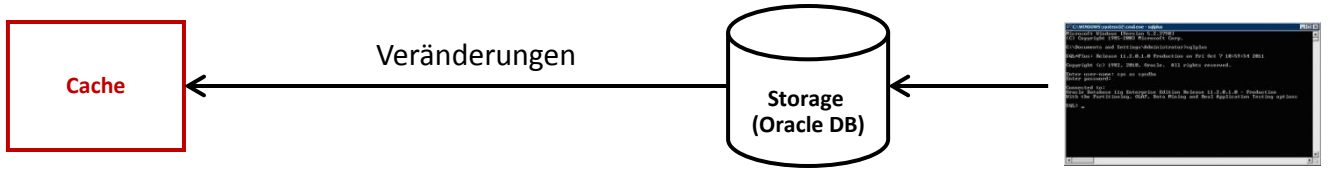


CacheStore

Write-Behind

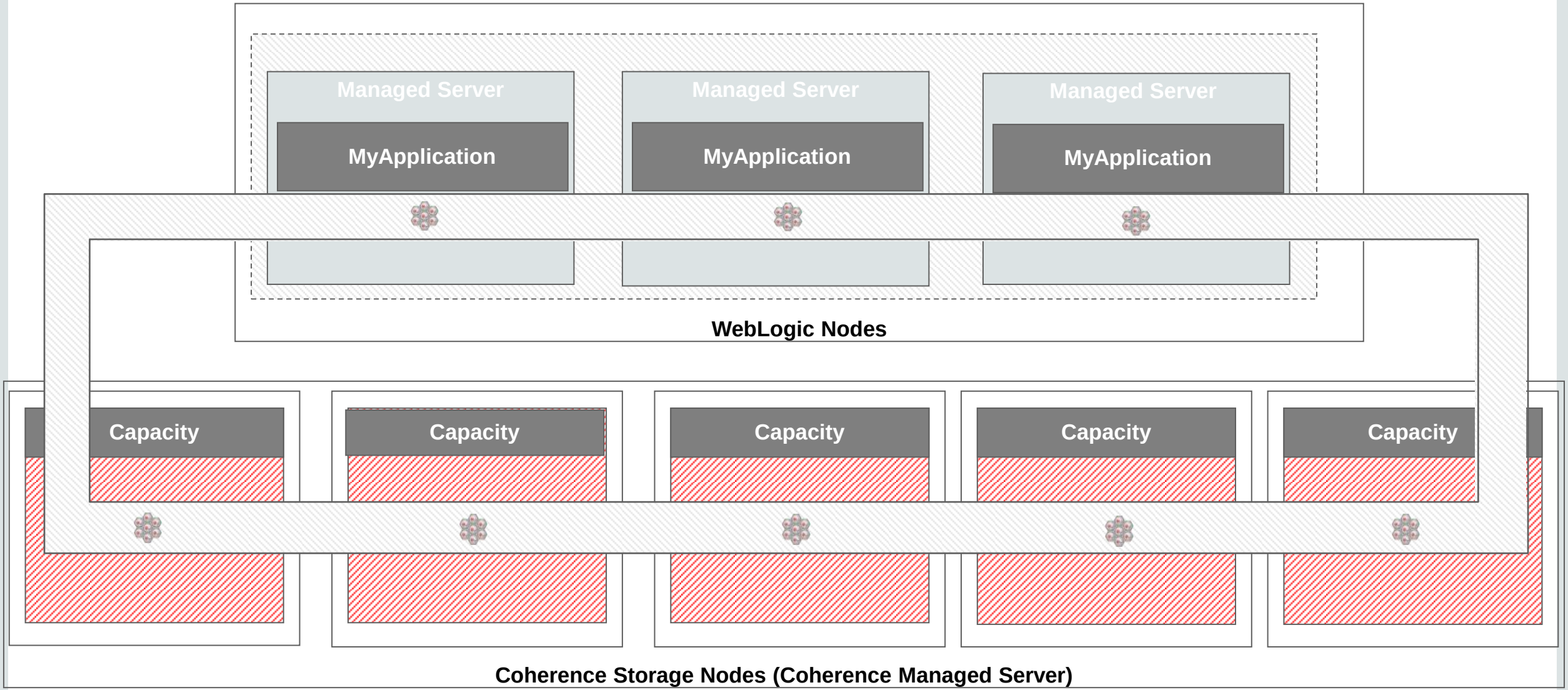


Coherence GoldenGate HotCache

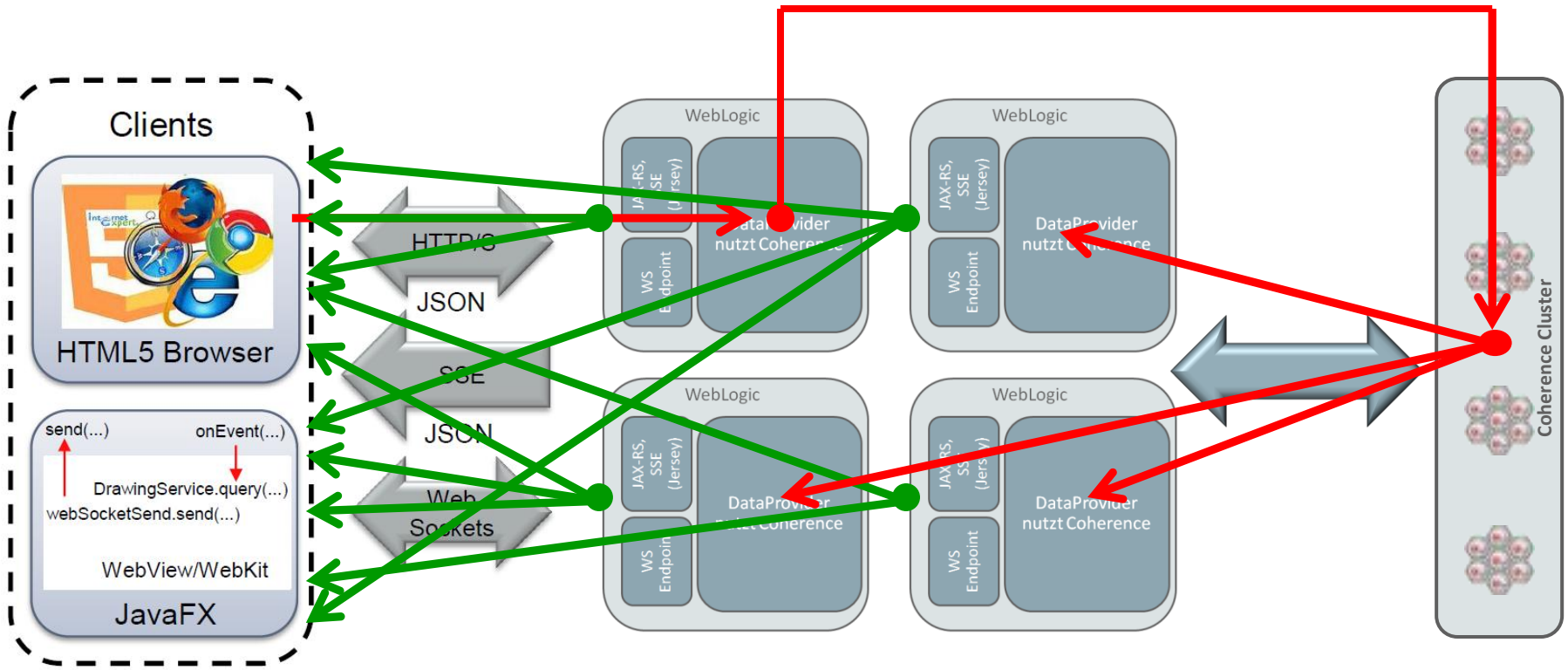


Veränderungen (z.B. Batch)

Java EE UND In-Memory Grid



Skalierbare Architektur: Eventbasiert



https://github.com/doschkinow/hol-sse-websocket, solutions/exercise9

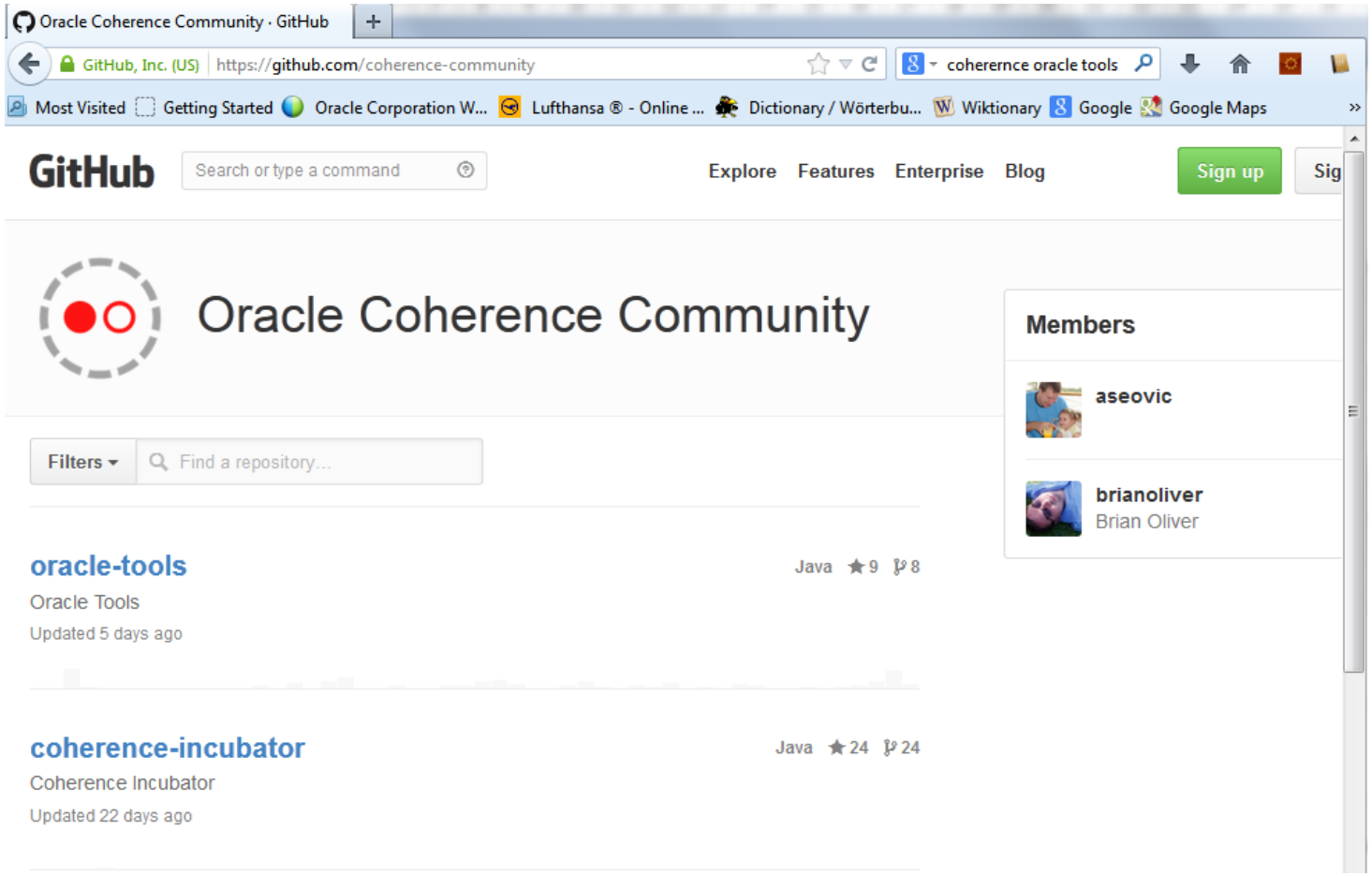
Einige kritische Erfolgsfaktoren - Betriebssicht

- Netzwerkkonfiguration und -planung
  - Bandbreite und Latenz: Coherence Netzwerk Tools kommen mit!
  - Konfiguration Netzwerkkarten (Linkaggregation unter Solaris (aktiv-aktiv vs. aktiv-passiv), z.B. IP Multipathing, DataLink Multipathing, etc. bei Solaris)
  - Konfiguration Switches
  - Rebalancing im Ausfall!
- Sorgfältige Kapazitätsplanung:
  - Anzahl der Knoten/JVMs: Kapazität, Planung für Fehlertoleranz
  - HW Planung: JVM Knoten per Rechenknoten (RAM, Prozessorkerne)
  - http://www.oracle.com/technetwork/middleware/coherence/planning-coherence-deployment-1985929.pdf

Einige kritische Erfolgsfaktoren - Entwicklersicht

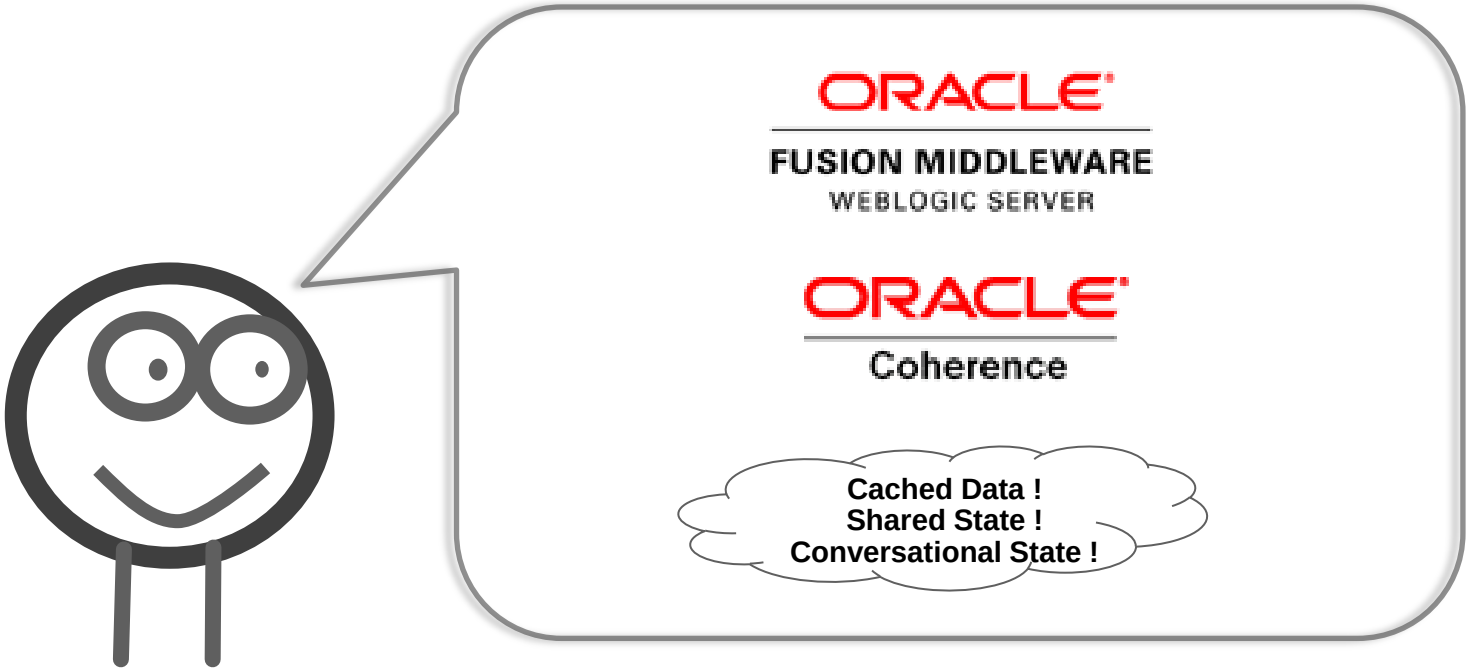
- Entscheide, was lokal oder verteilt benötigt wird
- Vermeide Standardserialisierungmechanismus: implementiere POF (Portable Object Format) mit 98:2 Regel
- Bringe Code zu den Daten, nicht Daten zum Code
- Denke über Parallelisierung nach
- Überdenke Dein Objektmodell
- Suche Einfachheit und Eleganz: kein „Overengineering“ von Anforderungen:
  - Bitte keine RDBMS nachimplementieren!

Hilfsmittel, Testen & Co



Demos

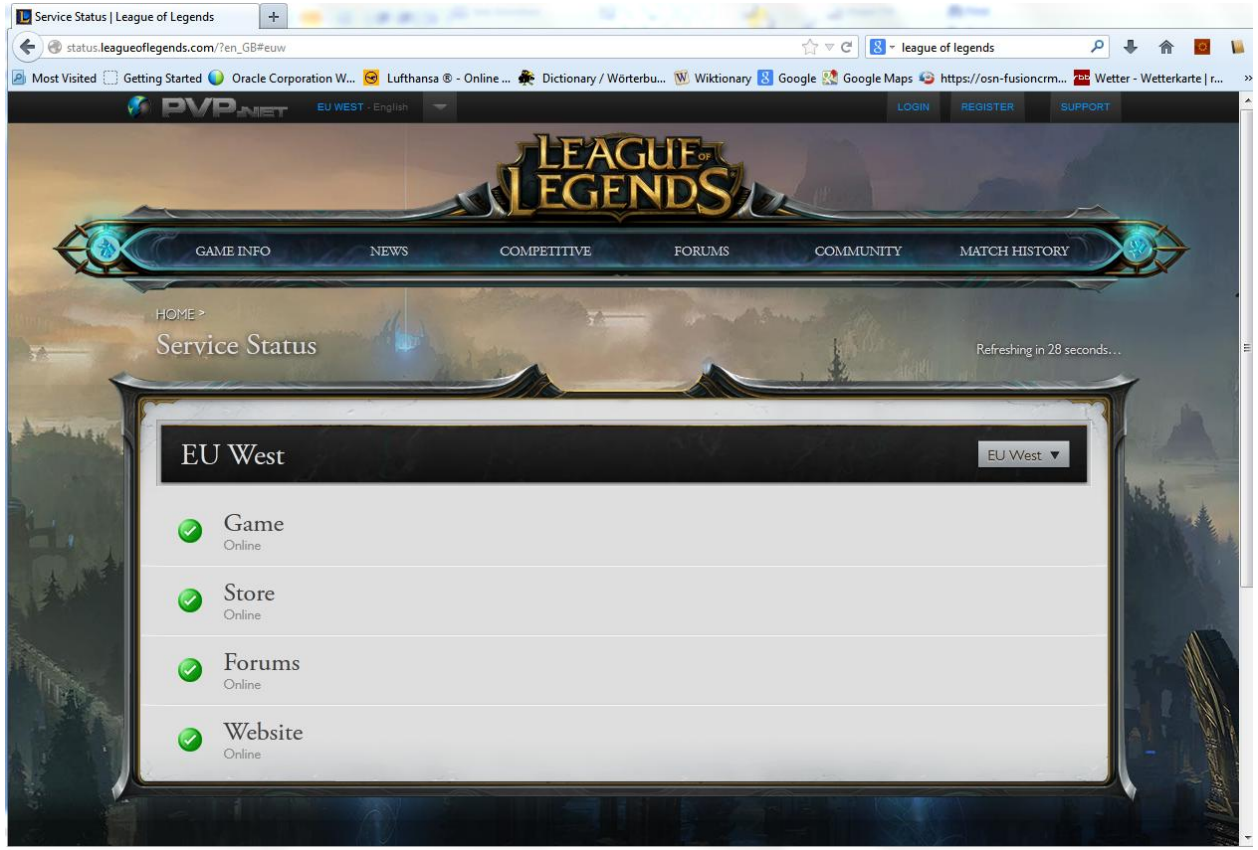
Zusammenfassung



Aber auch mit  , 

, ... ☺ . Try it.

Zusammenfassung



http://www.infoq.com/presentations/League-of-Legends
http://qconsf.com/sf2010/dl/qcon-sanfran-2010/slides/RandyStafford_and_ScottDelap_LeagueOfLegendsScalingToMillionsOfNinjasYordlesAndWizards.pdf
http://www.oracle.com/technetwork/middleware/coherence/coherence-case-studies-091909.html

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