Data Grids in Your World:
WebSphere eXtreme Scale
DataPower XC10

Context

Average impact of 1 second delay in response time for Web users

- Lost revenues
- Brand damage
- More support calls
- Increase costs
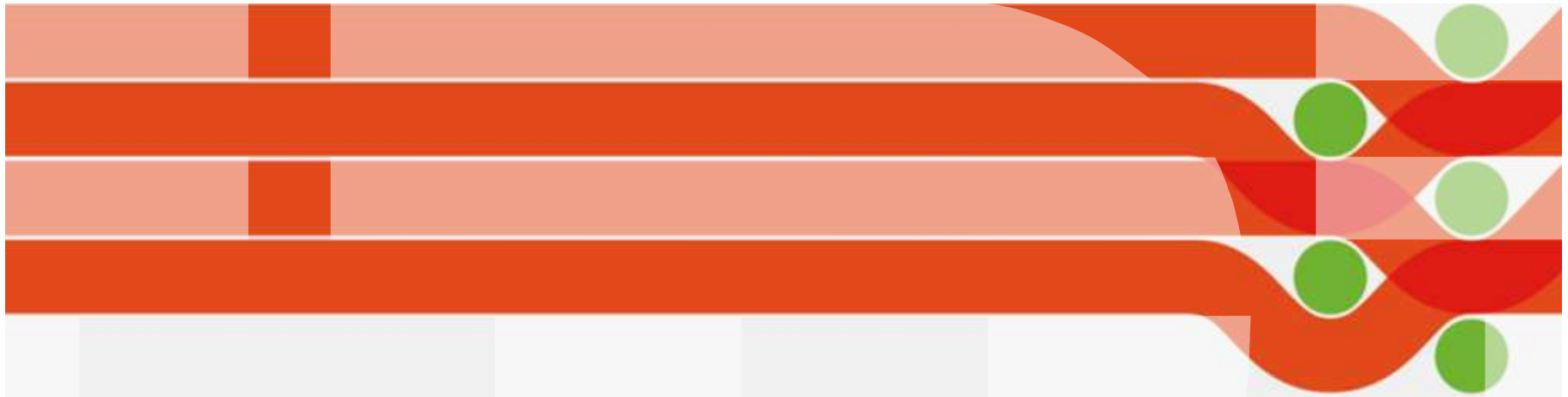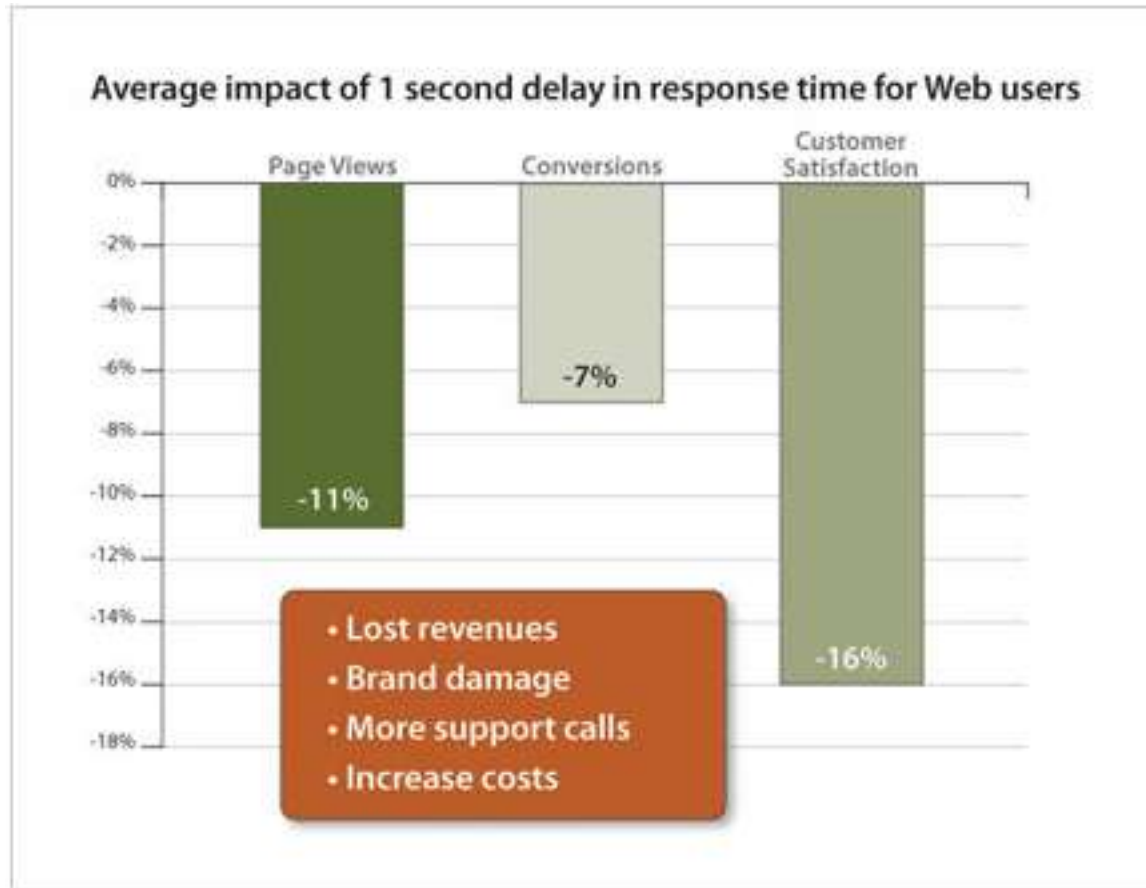
Aberdeen Group found that an average of one second delay in Web page response time negatively affected page views, conversions and customer satisfaction.[1]

1. "The Performance of Web Applications: Customers Are Won or Lost in One Second," Bojan Simic, Aberdeen Group, November 2008.

First, what's a cache?

- A database cache? A page fragment cache? A service Cache?
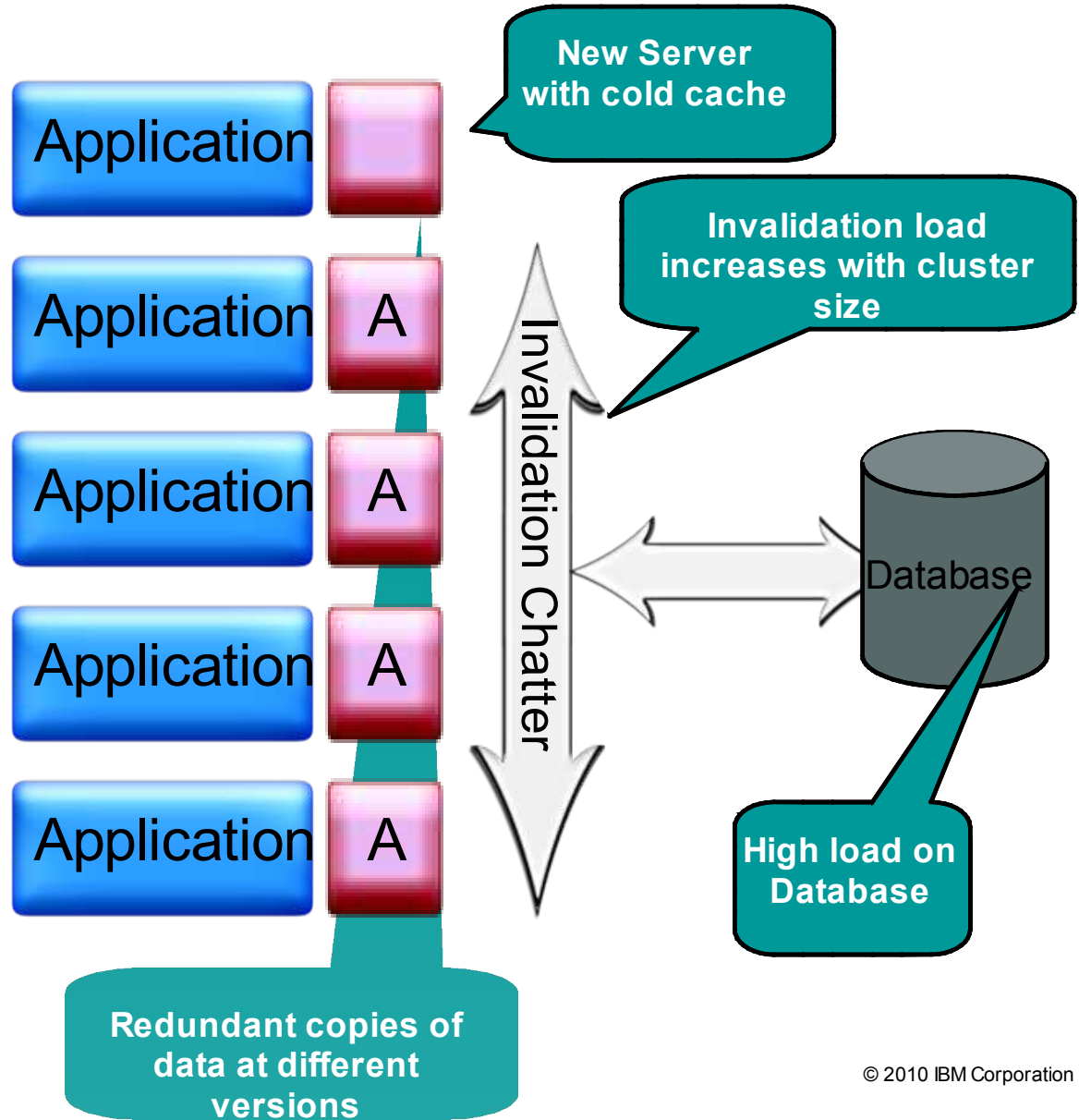
TOO SPECIFIC!

· A cache is a tool for **reducing application path length**

· OR the **distance data has to travel** before it gets to the customer/ data sink

| Akamai | Web Channel | Data Service | Logic | OR Map | DB |

Mobile Channel
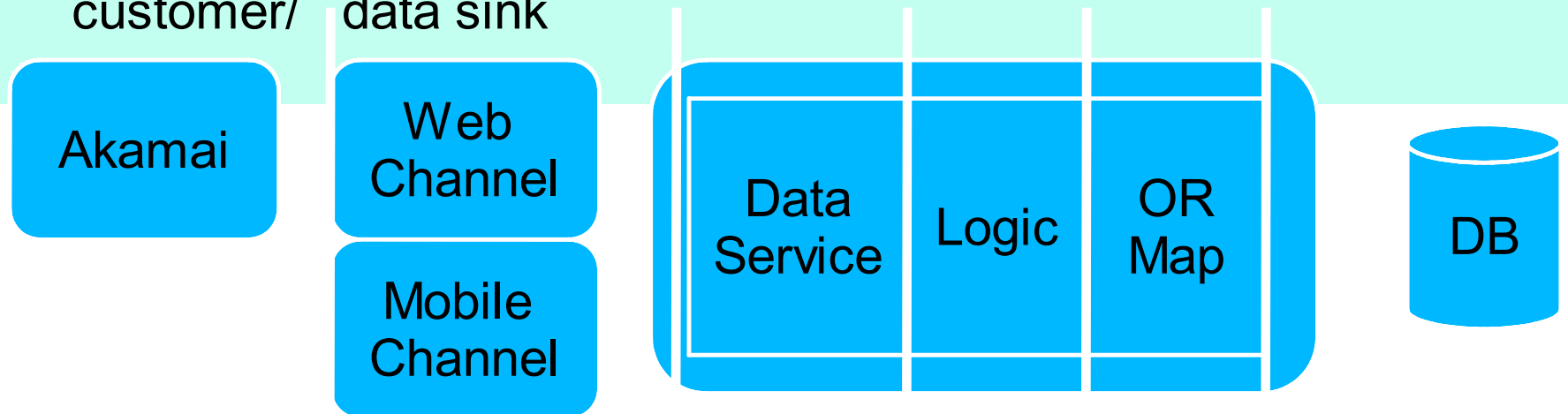
Traditional Application Cache Operation

- Cache capacity determined by individual JVM Size.
  - Size of each cache = M
  - # JVMs = N
  - **Total cache = M**

- Invalidation load per server increases as cluster grows.

- Cold start servers hit the database.

Application

New Server with cold cache

Application | A

Invalidation load increases with cluster size

Application | A

Invalidation Chatter

Database

Application | A

Application | A

High load on Database

Redundant copies of data at different versions

WebSphere eXtreme Scale, XC10 Cache Operation

- Cache capacity determined by total cluster size
  - Size of each cache = M
  - # JVMs = N
  - Total Cache = **M x N**

- No invalidation chatter

- Linearly scalable

- Less load on database and no cold start spikes

Application | E

Application | A | E'

Application | B | A'

Application | C | B'

Application | D | C'

Cache 5x Larger

4x
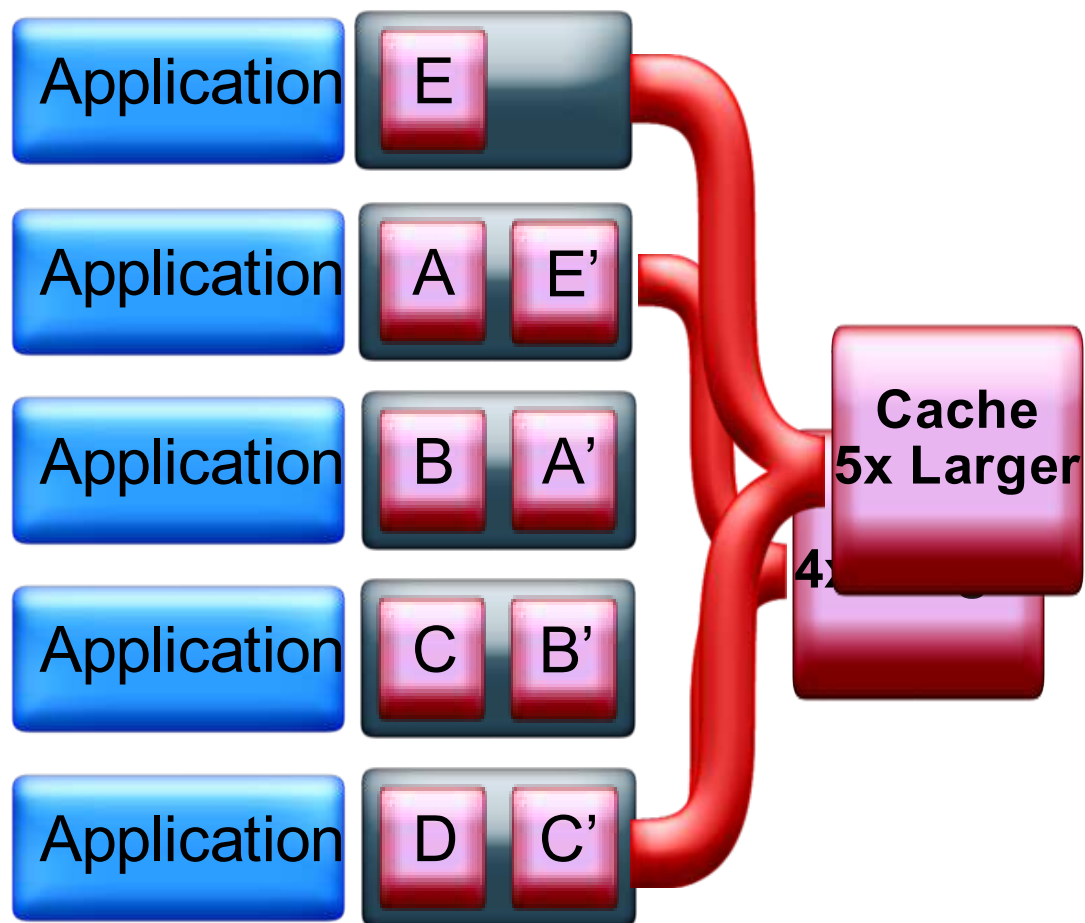
Modern Application Infrastructure Topology

Web Server Tier *App Server Tier* *Elastic Data Grid* *Database Tier*

New!

XC10

1 DataPower XC10 for simple data oriented scenarios:
• HTTP Session Replication
• Elastic Dynacache
• Web Side Cache

2 WebSphere software

eXtreme Scale for maximum flexibility covering data and application oriented scenarios

WebSphere software

IBM HTTP Server

WebSphere Application Server

Information Management

DB2 UDB

Innovative Elastic Caching Solutions

"Data Oriented"

New!

DataPower XC10 Appliance

- Drop-in cache solution optimized and hardened for data oriented scenarios
- High density, low footprint improves datacenter efficiency

Session management

Elastic DynaCache

Web side cache

Worldwide cache

Data buffer

Event Processing

Petabyte analytics

In-memory OLTP

In-memory SOA

"Application Oriented"

WebSphere software

eXtreme Scale

- Ultimate flexibility across a broad range of caching scenarios
- In-memory capabilities for application oriented scenarios

Elastic caching for linear scalability
High availability data replication
Simplified management, monitoring and administration

Customer Diversity
Data Grids are not just for investment banks!

- Retailers

- Insurance Companies

- Health care

- Retail Banking

- Hotel

- Travel Agencies

- Investment Banking

- Telco

- Government

- Utilities

- Trucking Companies

IBM

What is WebSphere eXtreme Scale?

A flexible framework for realizing high performance, scalable and data-intensive applications

San Francisco   Shanghai

London   New York
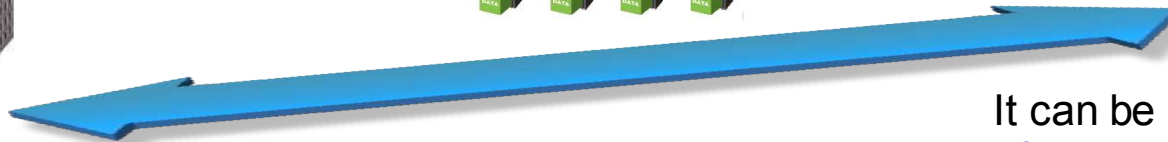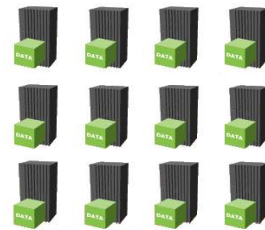
It can be used as a very powerful cache that scales from simple in-process topologies to powerful distributed topologies.

It can be used as a form of in memory database to manage application state (and it scales to 1000's of servers).

It can be used as a platform for building powerful XTP/ Data Grid applications.

WXS Installation Options

- Standalone Install
  - Packaged as a single JAR, 15MB total size
  - Requires J2SE, no other requirements
  - Main JARs: ogclient.jar, objectgrid.jar

- Integrate the eXtreme Scale with WebSphere Application Server:
  - Integrates with WAS V6.0, V6.1 and V7.0
  - Main JARs: wsogclient.jar, wsobjectgrid.jar

Native Integration with WebSphere Application Server

- **eXtreme Scale was designed for native & deep integration with WAS**

- **eXtreme Scale works with ALL WAS 6.X and 7.X versions**

- **eXtreme Scale extends the value of WAS deployments by providing:**

  - Session management plug-in for multi data centre support

  - Dynamic cache plug-in to turbo-charge existing caching environments

  - JPA / Hibernate side-cache to accelerate existing database queries

Session Management Plug-in **Dynamic cache service Plug-in** **SIP Support** **JPA / Hibernate Side-cache**

Global Transaction Integrity **Deep Management Integration** **Programming Models** **Serviceability**

WebSphere eXtreme Scale

WebSphere Application Server

Ease of Use/Exploitation

- Dynamic Cache Service plugin (read-only side cache pattern)
  – Configuration only

- Hibernate / OpenJPA L2 cache plugin (read-only side cache pattern)
  – Configuration only

- HTTP Session Management
  – Configuration, run tool on WAR files

- RYO Side cache for:
  – ESB cache mediation
  – SOA result cache
  – WebService/EIS/…/any result cache
  – Insert some code at key points to cache "expensive" results/data

Ease of Use/Exploitation

- In-line cache, system of record
  - Change app DB access to grid access
  - Also need partitionable (Constrained Tree Schema) data model

- Advanced grid exploitation
  - Move processing to the data
  - Map/Reduce programming model
  - Add advanced APIs to your code

Common set of patterns

- Inline backend cache
  - Loaders used to integrate with an existing data service
  - Read through cache
  - Write through cache

- System of Record Data Store
  - Cache is used as the system of record
  - Write behind technology pushes changes asynchronously to the backend.

App

Loader

Back End
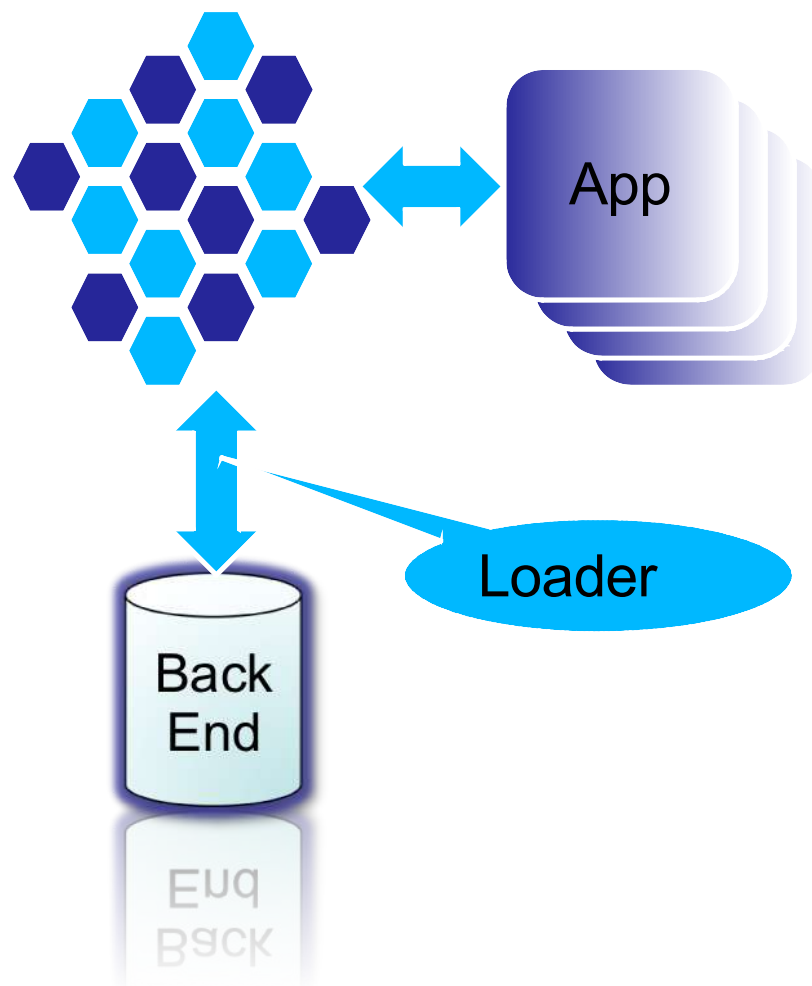
Introducing IBM WebSphere DataPower XC10 Appliance

- ## Easy drop in use for common scenarios

  – Support for **data-oriented caching scenarios** without rip & replace

- ## Scale out with ease

  – **Large, elastic cache** allows you to scale more economically while providing high Quality of Service

- ## Fault tolerance

  – Lower risk of data loss while providing **continuous availability**

- ## Flexible and simple user management

  – Simple solution for **real world management and monitoring**

XC10: Easy drop-in use for common scenarios

- HTTP Session Management

- WAS Dynamic Cache Service ("Dynacache") support

- Web Side Cache
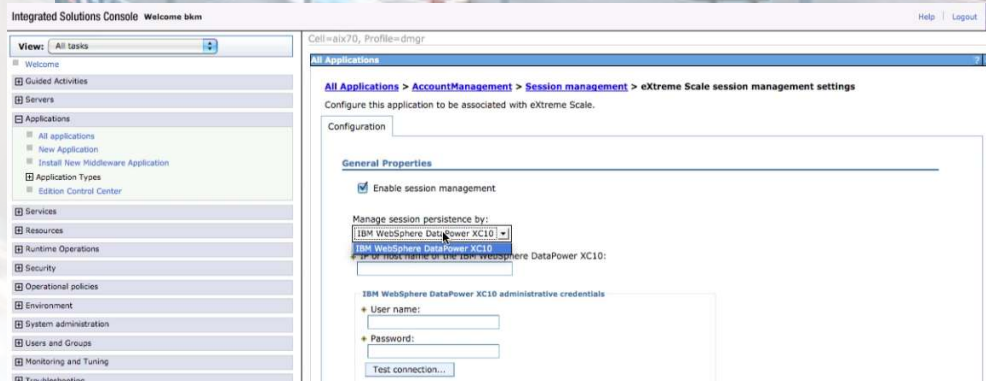
Little or no code changes required!

End-to-end Session Management Scenario

WebSphere Application Server side

DataPower XC10 appliance side

WebSphere Application Server

(2) Install DataPower XC10 client code

(1) Install DataPower XC10 Appliance

Welcome

Integrated Solutions Console provides a
administered through this installation. Se
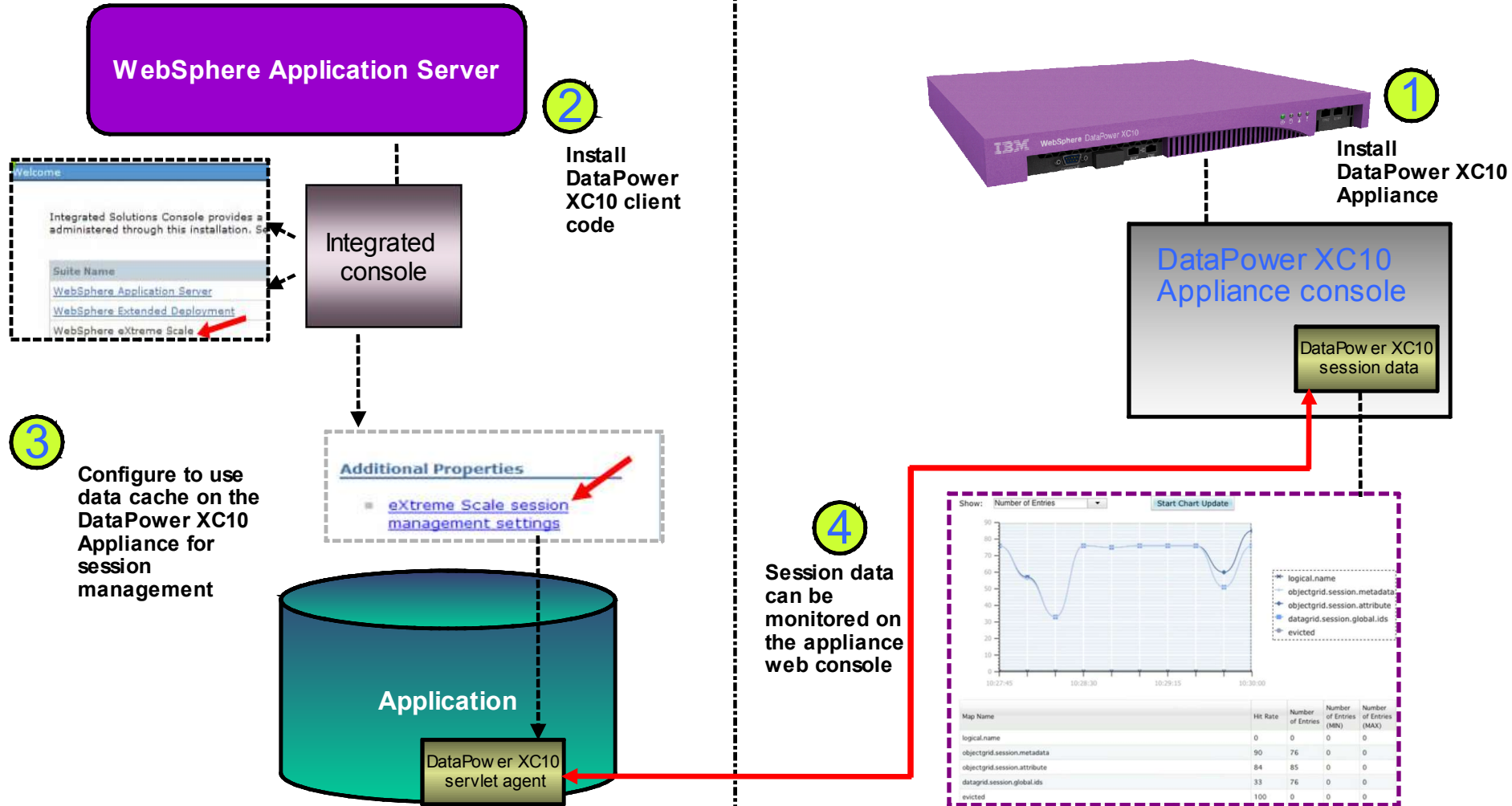
Suite Name

WebSphere Application Server

WebSphere Extended Deployment

WebSphere eXtreme Scale

Integrated console

DataPower XC10 Appliance console

DataPower XC10 session data

(3) **Configure to use data cache on the DataPower XC10 Appliance for session management**

Additional Properties

eXtreme Scale session management settings

(4) **Session data can be monitored on the appliance web console**

Application

DataPower XC10 servlet agent

Show: Number of Entries   Start Chart Update

- logical.name
- objectgrid.session.metadata
- objectgrid.session.attribute
- datagrid.session.global.ids
- evicted

| Map Name	Hit Rate	Number of Entries	Number of Entries (MIN)	Number of Entries (MAX)
logical.name	0	0	0	0
objectgrid.session.metadata	90	76	0	0
objectgrid.session.attribute	84	85	0	0
datagrid.session.global.ids	33	76	0	0
evicted	100	0	0	0

XC10: Dynamic Cache service support

- DataPower XC10 provides client code and a plug-in for WebSphere Application Server applications to support DynaCache API

- Allows applications deployed to WebSphere servers to use DataPower XC10 as a "drop-in" cache, instead of storing cache data in local memory or multiple instances of a disk cache

XC10: Web Side Cache
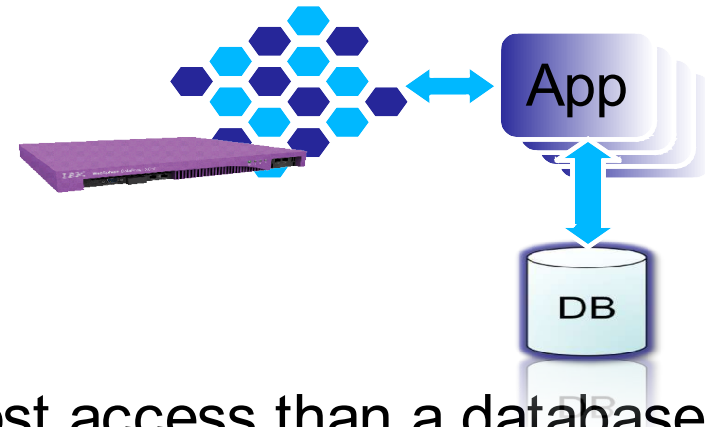
- Used to store data for fast, lower-cost access than a database

- Uses ObjectMap APIs from WebSphere eXtreme Scale

- Every time data is needed, the web side cache on the DataPower XC10 Appliance is checked first

- If the value is not found (cache miss), then the data is retrieved from the backend database and inserted into the cache

- Client can run in a standard Java EE compliant server environment or in any Java Virtual Machine compliant with Java SE V1.4 or beyond

WXS and XC10 Focus on Data-Oriented Distributed Caching Scenarios

application oriented

In-memory SOA

In-memory OLTP

Internal clouds

Complex Event Processing

WebSphere software

eXtreme Scale

Worldwide cache

Shared cache

Data buffer

Petabyte analytics

XC10 Focus

Session management

Elastic DynaCache

Web side cache

data oriented

Application change required (vertical axis)

Save money ← **Customer Goal** → *Grow Business*