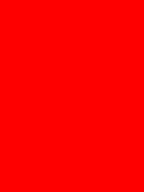# ORACLE®

**Next Generation Grid Enabled SOA:
Not Your MOM's Bus**

Dave Chappell
VP & Chief Technologist,
SOA

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle's products remains at the sole discretion of Oracle.

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About th

THEORY IN PRACTICE

Enterprise Service Bus

CXXXII
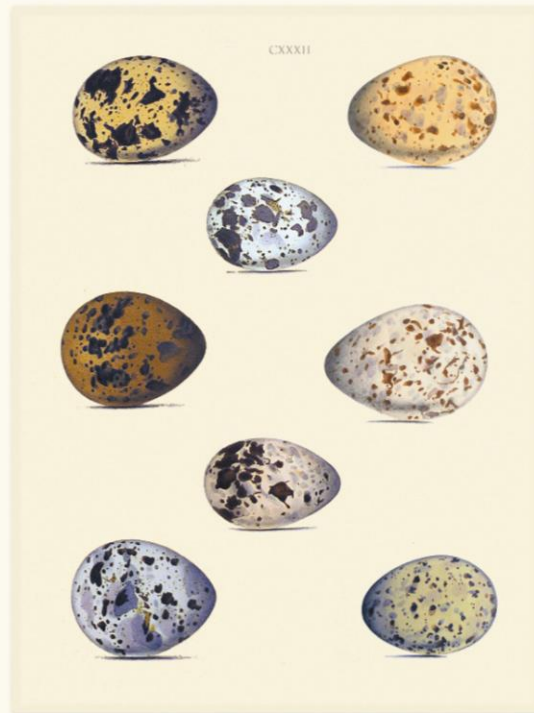
DAVID A. CHAPPELL

W3C

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Agenda/Outline

- SOA Today: Drivers for Change
- SOA Tomorrow: SOA Grid
  - State Management in the SOA Grid
  - Stateful Load Balancing and HA
- QoS and Distributed SOA Processing
  - Not Your MOM's Bus
- Use Cases – BPEL and ESB Mediation
  - Claim Check Pattern
  - Relocatable Stateful Orchestrations (BPEL)
- New Model for Scaling SOA
- Summary

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SOA Today: Level Setting
What were we suppose to get from SOA?

- **IT Management Paradigm Shift**
  - Reduce Cost and Complexity
    - Service Enablement of IT Assets
    - Leverage investment, reuse
- **Business Agility**
  - Better align with the Business Needs
  - Automate Business Function
    - Business Process Orchestration
    - Composite Applications
- **Flexibility**
  - Loose Coupling, Modularity
  - Easily integrated, upgraded, replaced
- **Re-Focus on Innovation, New Business Services**

Large XML Payloads

Tearing Down / De-coupling Silos

Unexpected Usage Demands

Meeting SLA Expectations

Sharing Information Across Multiple Services

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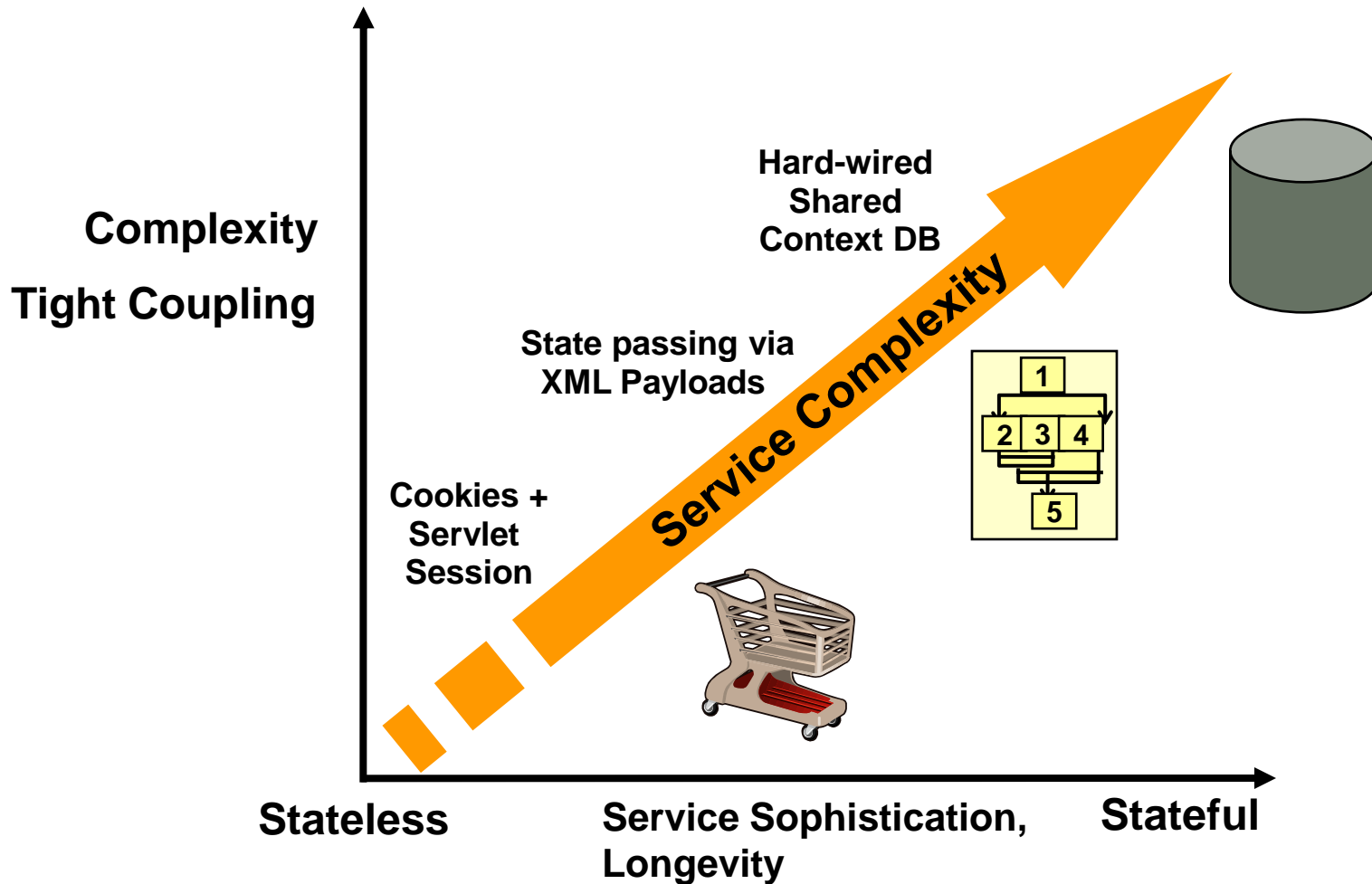# Drivers for Change: The Evolving Problem Set 50,000 foot view

- **SOA Architect: Tearing Down Silos**
  - Reuse of Shared Services
  - New Flexible Business Processes
- **IT Operations: Deployment Complexity**
  - How many configurations of servers?
  - When and how to add more flavors?
- **Cost and Efficiency**
  - Datacenter resource utilization
    - Usage typically 13% – 17%
    - Virtualization only solves part of the problem

Tight Coupling & Contention Between SOA Architect & IT Operations

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State Management Techniques in SOA Applications

Complexity

Tight Coupling

Service Complexity

Hard-wired
Shared
Context DB

State passing via
XML Payloads

Cookies +
Servlet
Session

Stateless

Service Sophistication,
Longevity

Stateful

1
2 3 4
5

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The SOA Grid

- State-aware continuous availability for service infrastructure, application data, and processing logic
- Predictable scalability for XTP
  - Scales out linearly, whether 2 or 2,000 servers
  - Heterogeneous Environment
  - High-end / low-cost commodity hardware
- Data Grid and Compute Grid
  - Linearly scalable shared memory and logic
  - Intelligent co-location and affinity between processing logic and Grid storage
- Dramatic overall increase in performance and throughput
  - Reduced/Eliminate dependency on disk persistence
  - Without sacrificing HA

Oracle Coherence Customers
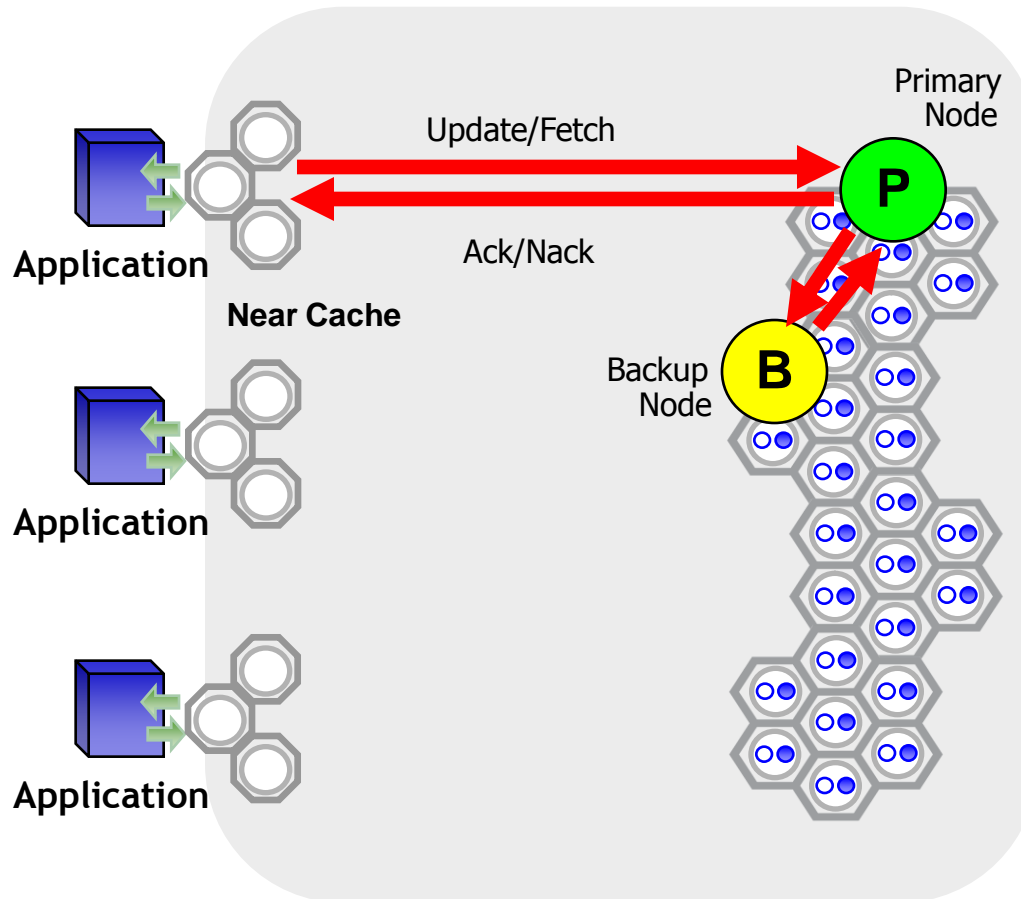
Sampling of Customers

100 Direct Customers and 1,500+ production installations

SOA Grid - Primary/Backup synchronization

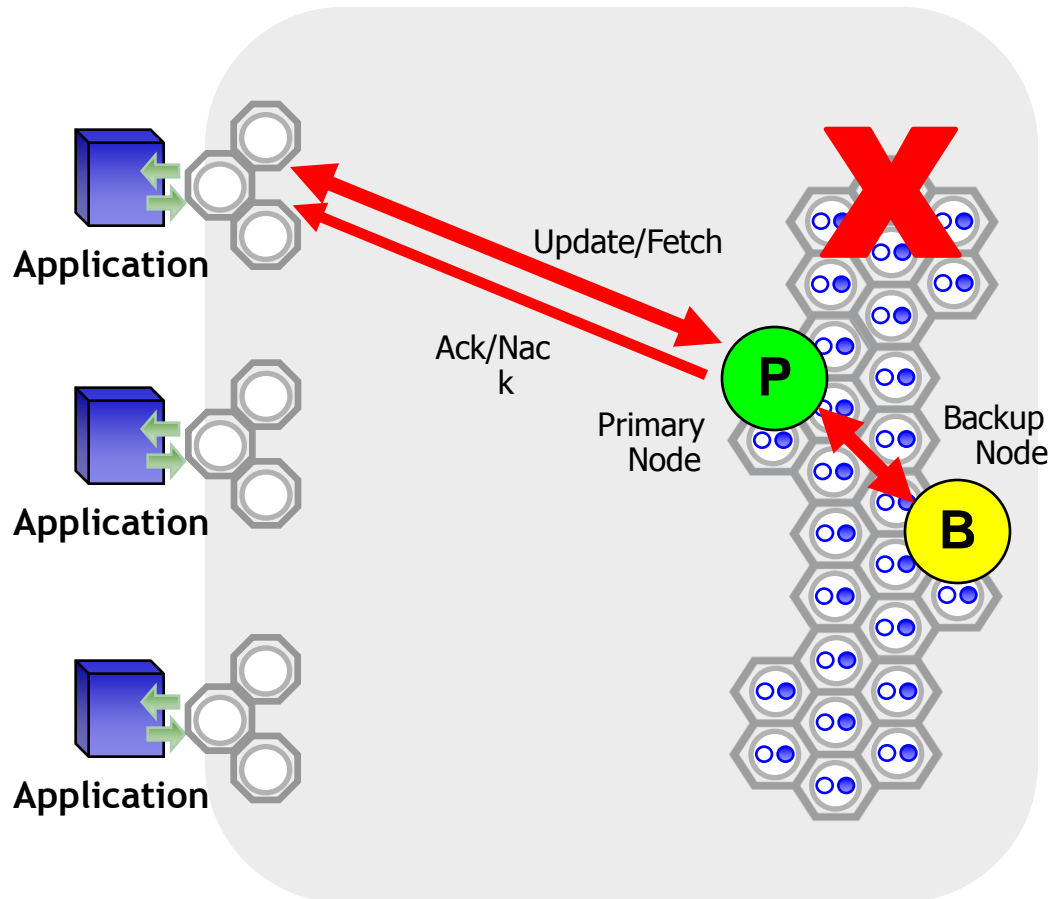Non-storage-aware
Datagrid clients

Storage-aware
Datagrid servers

Primary
Node

Update/Fetch

P

Application

Ack/Nack

Near Cache

Backup
Node

B

Application

Application

Available Today with Oracle Coherence

SOA Grid - Primary/Backup synchronization

Non-storage-aware
Datagrid clients

Storage-aware
Datagrid servers

Application

Application

Application

Update/Fetch

Ack/Nack

Primary
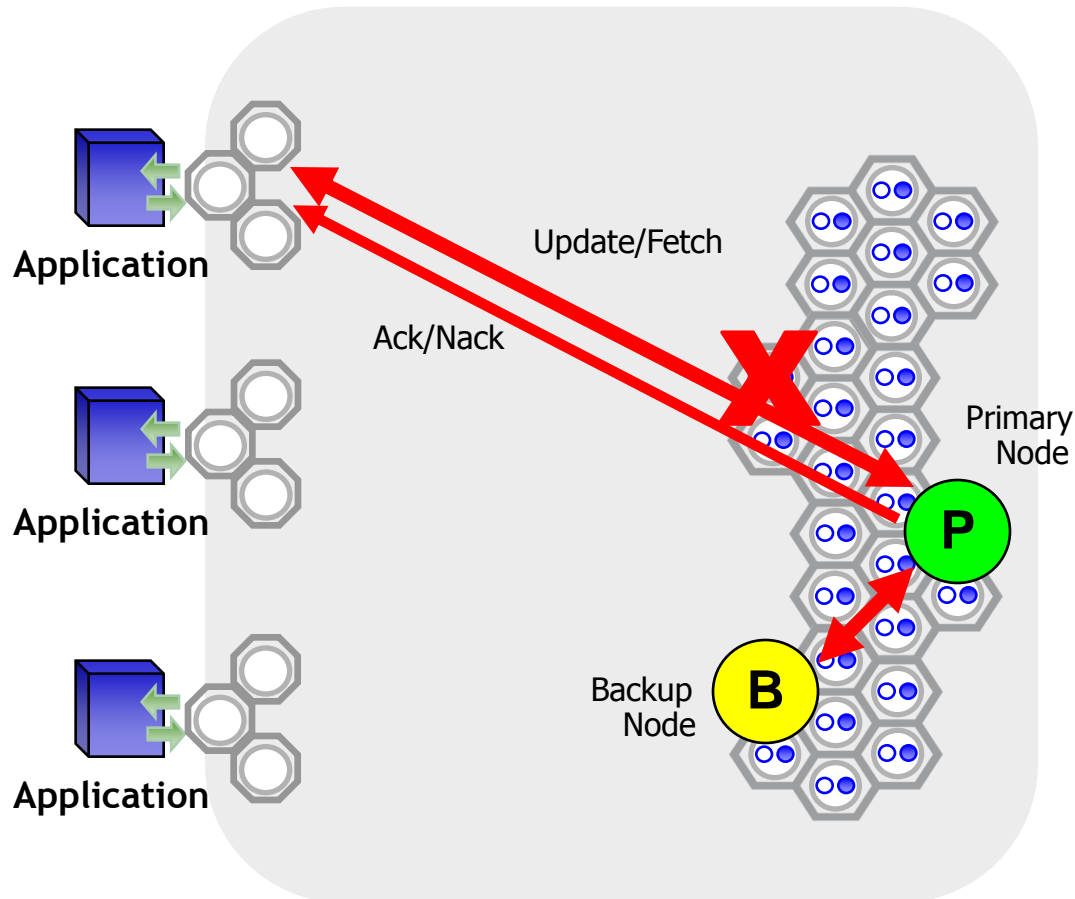Node

P

Backup
Node

B

Available Today with Oracle Coherence

SOA Grid - Primary/Backup synchronization

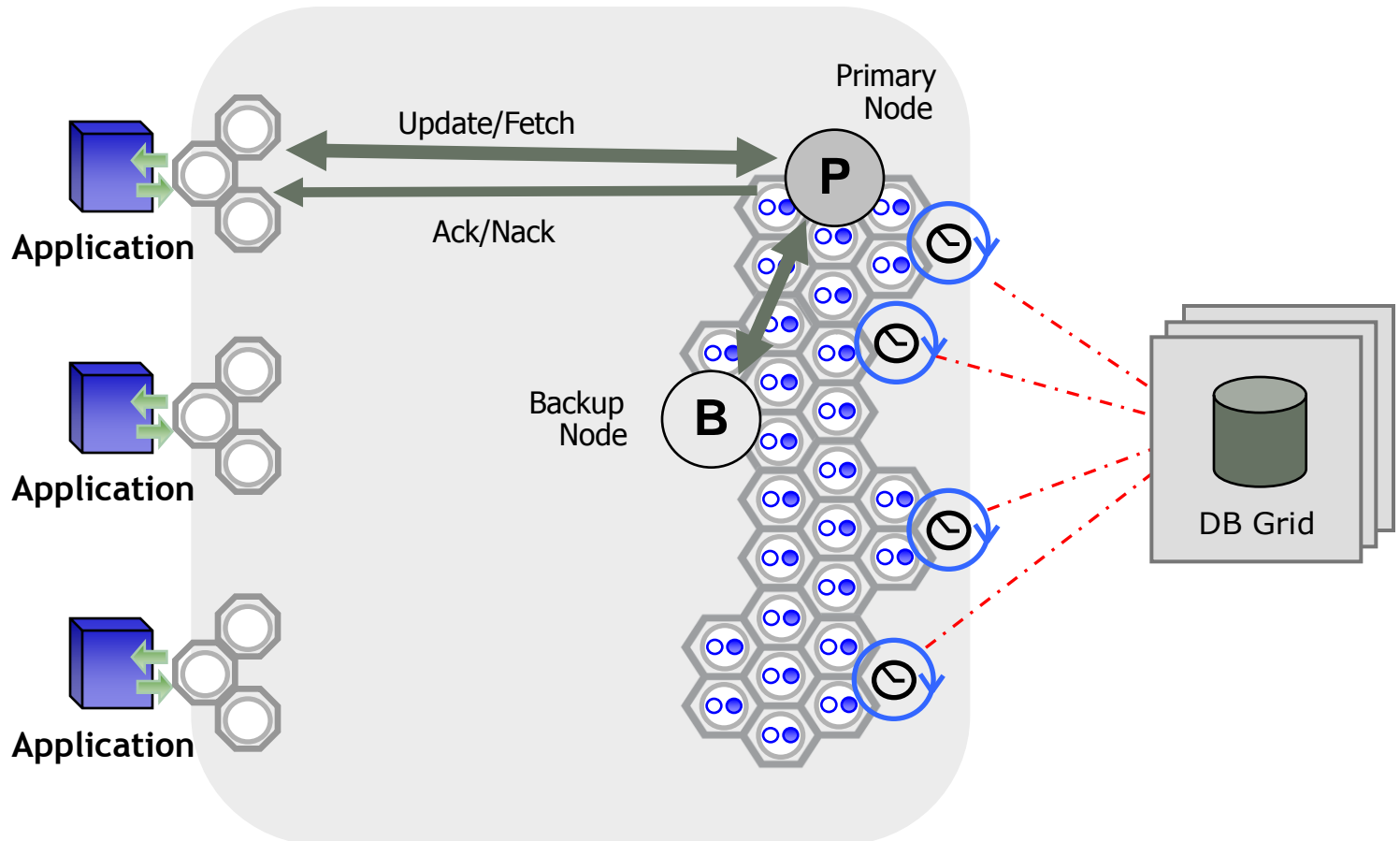Non-storage-aware
Datagrid clients

Storage-aware
Datagrid servers

Application

Update/Fetch

Ack/Nack

Application

Primary
Node

P

Backup
Node

B

Application

Available Today with Oracle Coherence

Asynchronous DB Updates

Non-storage-aware
Datagrid clients

Storage-aware
Datagrid servers

Primary Node

P

Update/Fetch

Ack/Nack

Application

Backup Node

B

Application

DB Grid

Application
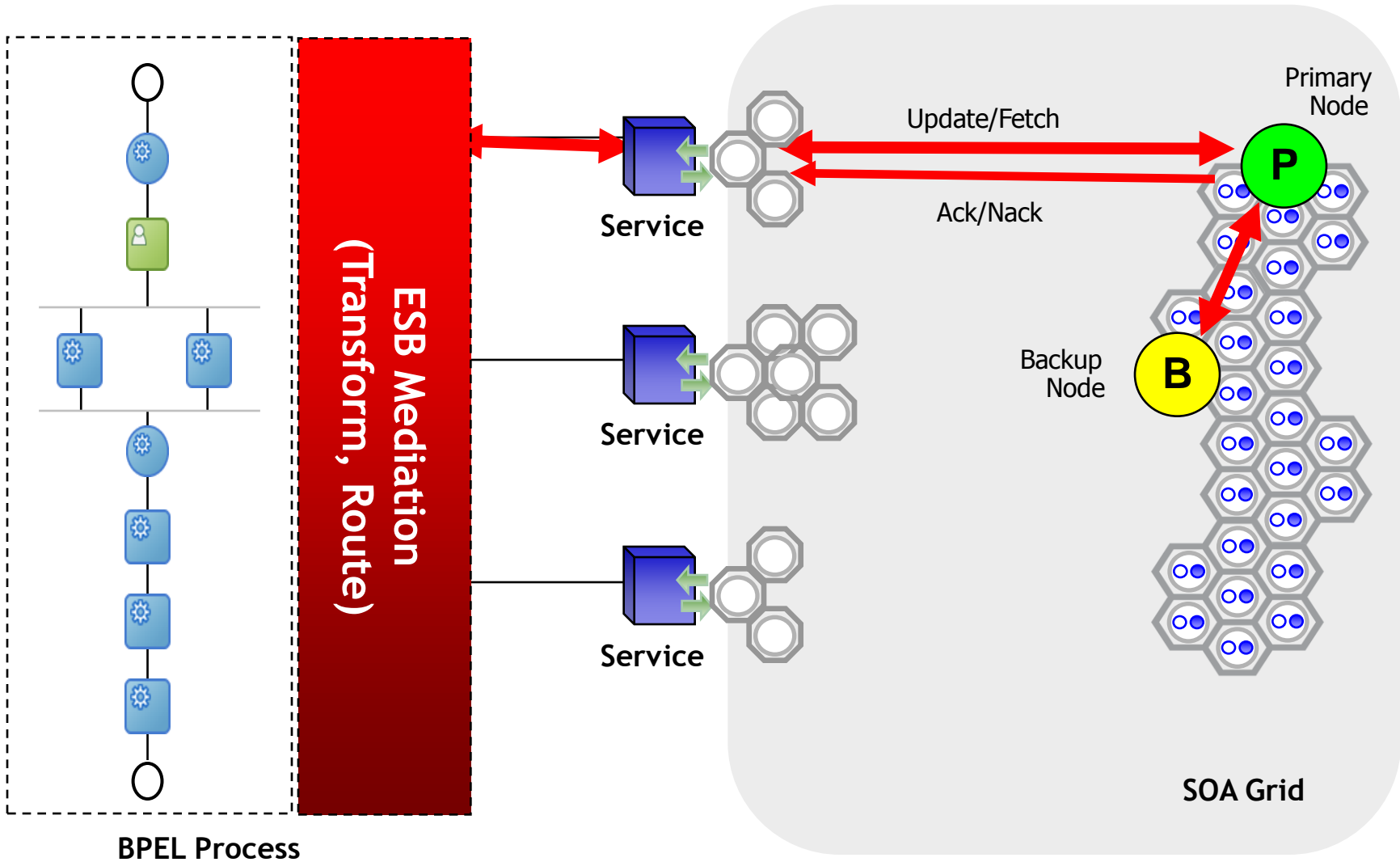
Available Today with Oracle Coherence = Write Behind Queue

State-Based Notifications

SOA Grid

BPEL Process

ESB Mediation (Transform, Route)

Service

Service

Service

Update/Fetch

Ack/Nack

Primary Node

P

Backup Node

B

SOA Grid

Usage Patterns with Oracle Coherence and ESB/BPEL

Stateful Service load balancing

Service 'A'
Invocation

Service A

ESB Mediation
(Transform, Route)

Service A1

Update/Fetch

Ack/Nack

Primary Node

P

Backup Node

B

BPEL Process

Load Balanced Services

SOA Grid

Usage Patterns with Oracle Coherence and ESB/BPEL

Stateful Service load balancing

Service 'A1'
Invocation

Primary
Node

P

Backup
Node

ESB Mediation
(Transform, Route)

Service
A

B

Fetch

Service
A1

BPEL Process

Load Balanced
Services

SOA Grid

Usage Patterns with Oracle Coherence and ESB/BPEL

Stateful Service availability/failover

Service 'A' Invocation

ESB Mediation (Transform, Route)

Service A

Service A1

Update/Fetch

Ack/Nack

Primary Node

P

Backup Node

B

BPEL Process

Load Balanced Services

SOA Grid

Usage Patterns with Oracle Coherence and ESB/BPEL

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Stateful Service availability/failover

Service 'A1' Invocation

ESB Mediation (Transform, Route)

Service A

Service A1

BPEL Process

Load Balanced Services

SOA Grid

Primary Node

Backup Node

Fetch

P

B

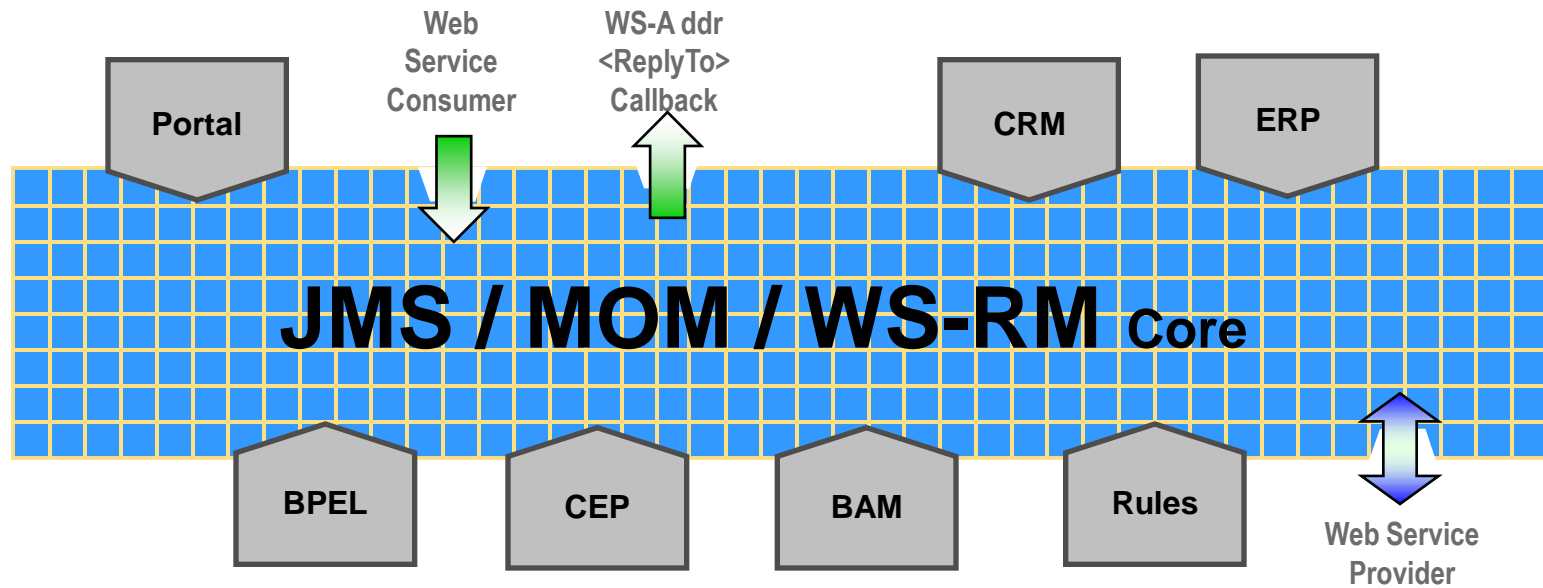**Usage Patterns with Oracle Coherence and ESB/BPEL**

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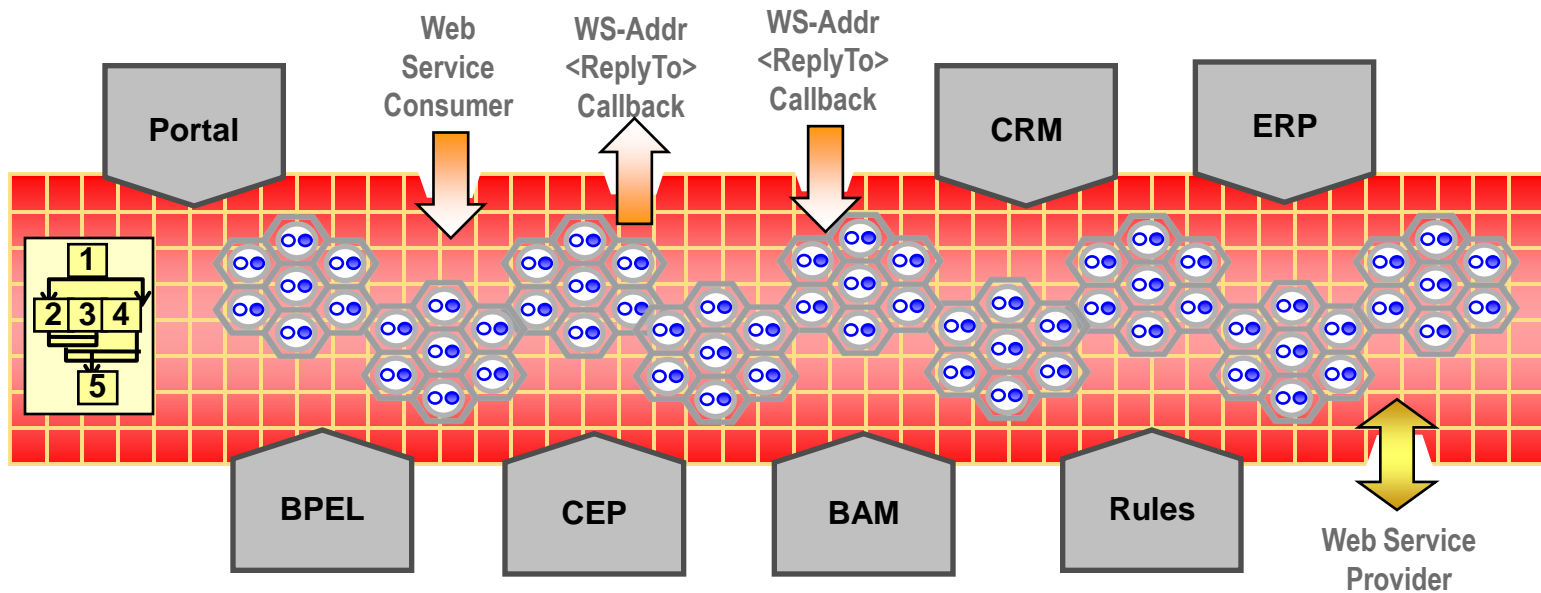- New Model for Scaling SOA
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SOA Grid – Not Your MOM's Bus
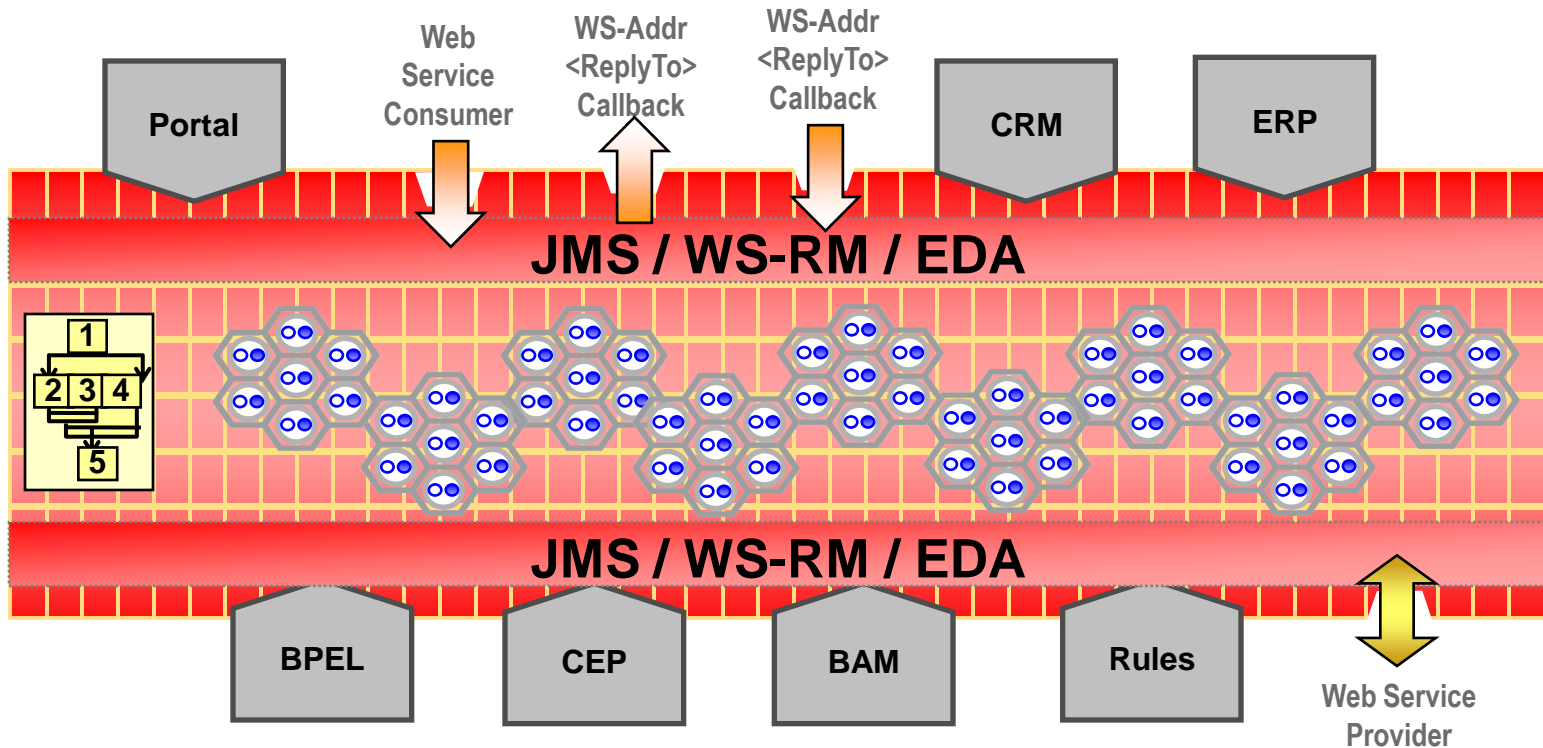
Conventional Messaging for QoS

SOA Grid – Not Your MOM's Bus

Why send it when its already there?

That Being Said…

Still Plenty of Use Cases for Conventional Messaging
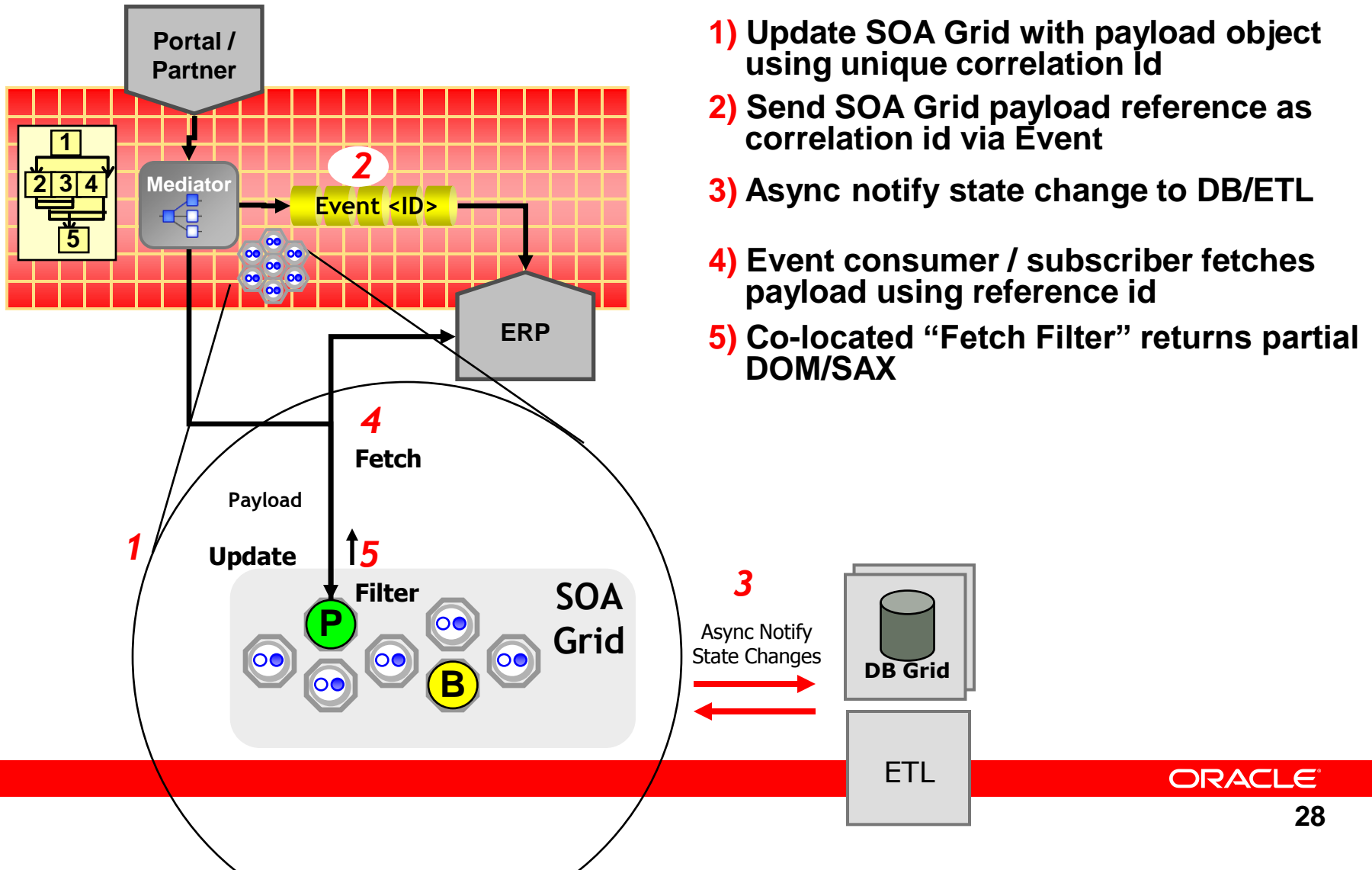
Rule of Thumb

- Still need MOM for –
  - Familiar client API / usage model
  - Ordering
  - Pub/Sub
- Avoid putting state in Queues where it doesn't belong
- Avoid "sending" stuff when it doesn't really have to travel anywhere
- "Subscribe" to state changes in the grid using observer pattern
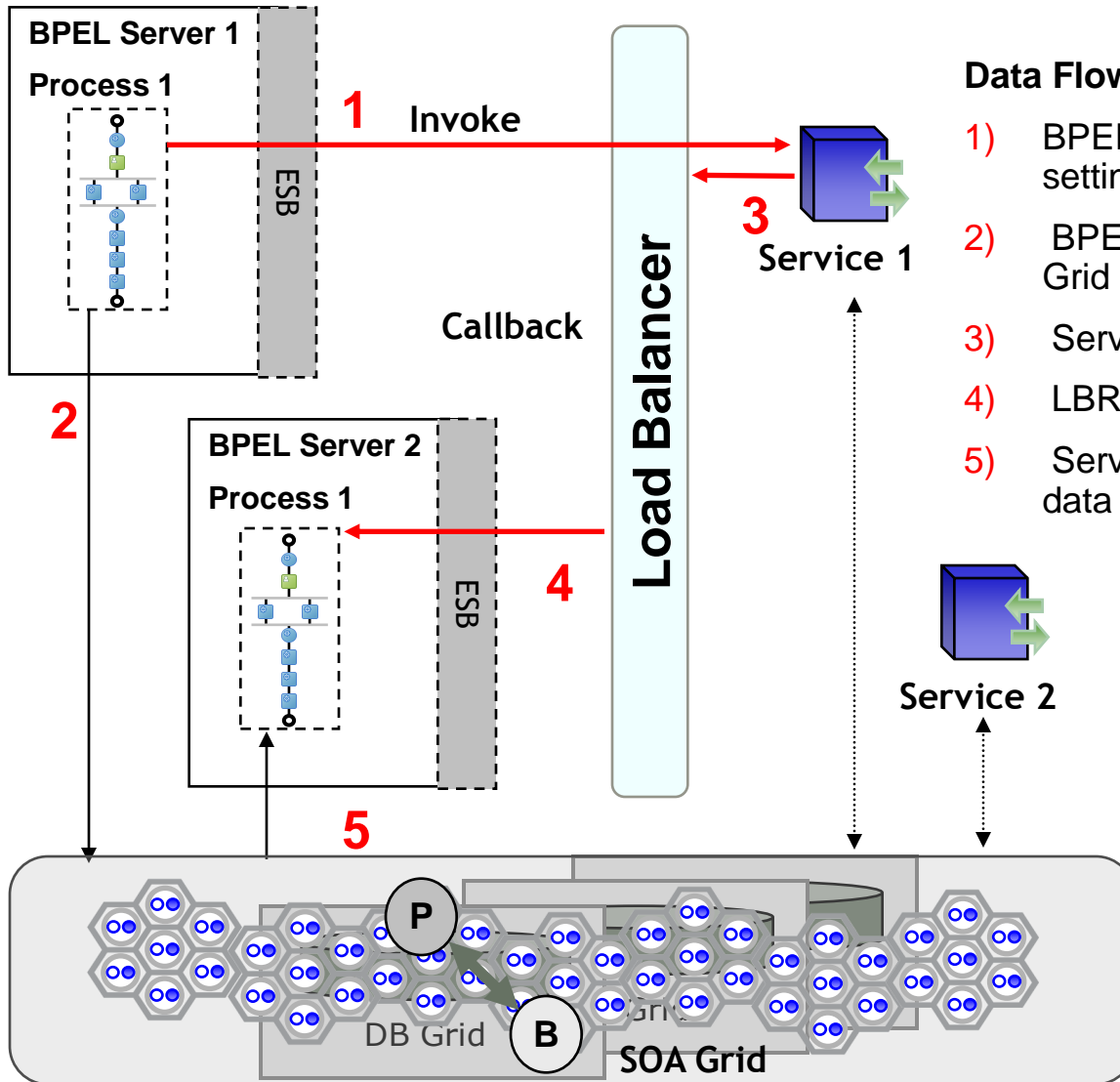
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SOA Grid Mediation Use Case

Claim Check / Pass-by-ref Pattern

Portal / Partner

1 2 3 4 5

Mediator

2 Event <ID>

ERP

4 Fetch

Payload

Update

1

5 Filter

P

B

SOA Grid

3

Async Notify State Changes

DB Grid

ETL

1) **Update SOA Grid with payload object using unique correlation Id**

2) **Send SOA Grid payload reference as correlation id via Event**

3) **Async notify state change to DB/ETL**

4) **Event consumer / subscriber fetches payload using reference id**

5) **Co-located "Fetch Filter" returns partial DOM/SAX**

BPEL Dehydration Example

Data Flow

1) BPEL Server 1 Process 1 invokes Service 1 setting callback URL to LBR

2) BPEL Server 1 Process 1 dehydrates to Grid

3) Service 1 Invokes LBR

4) LBR invokes BPEL Server 2 Process

5) Server 2 Process 1 rehydrates process data from grid and continues

Service 1 and 2 can store their own data in the SOA Grid but they do not require access to the BPEL dehydration store in this example.
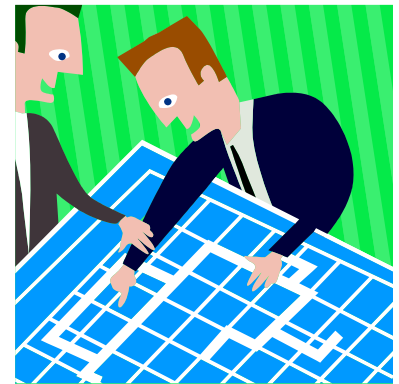
Relocatable BPEL processes
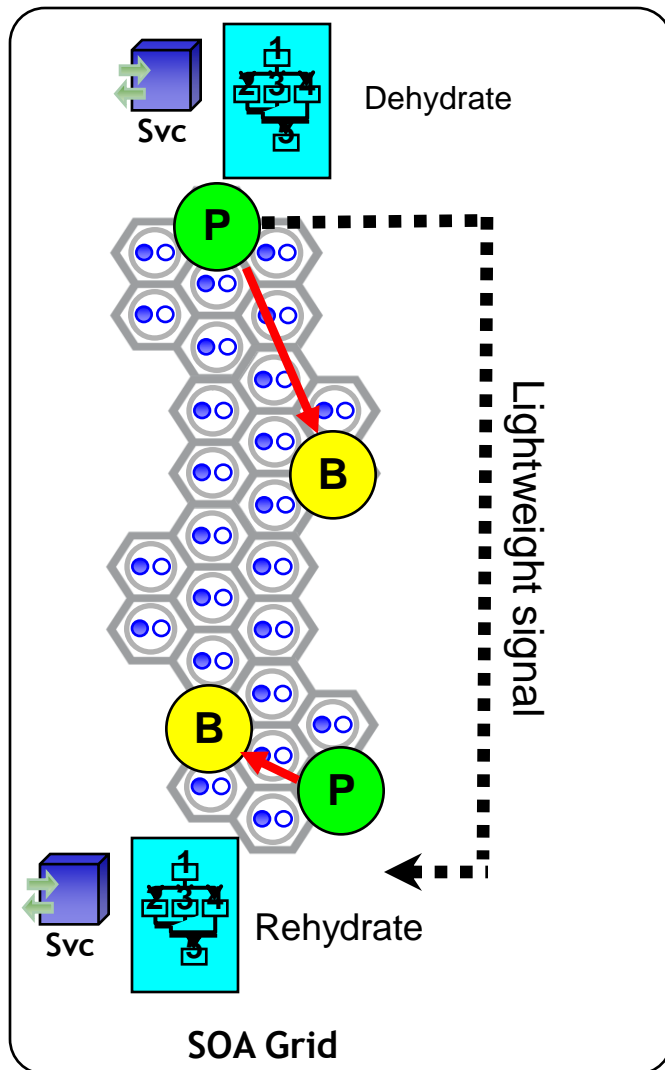
- Activate/Rehydrate BPEL process where the next service resides

- Efficient co-location of Process/Service Logic/Data
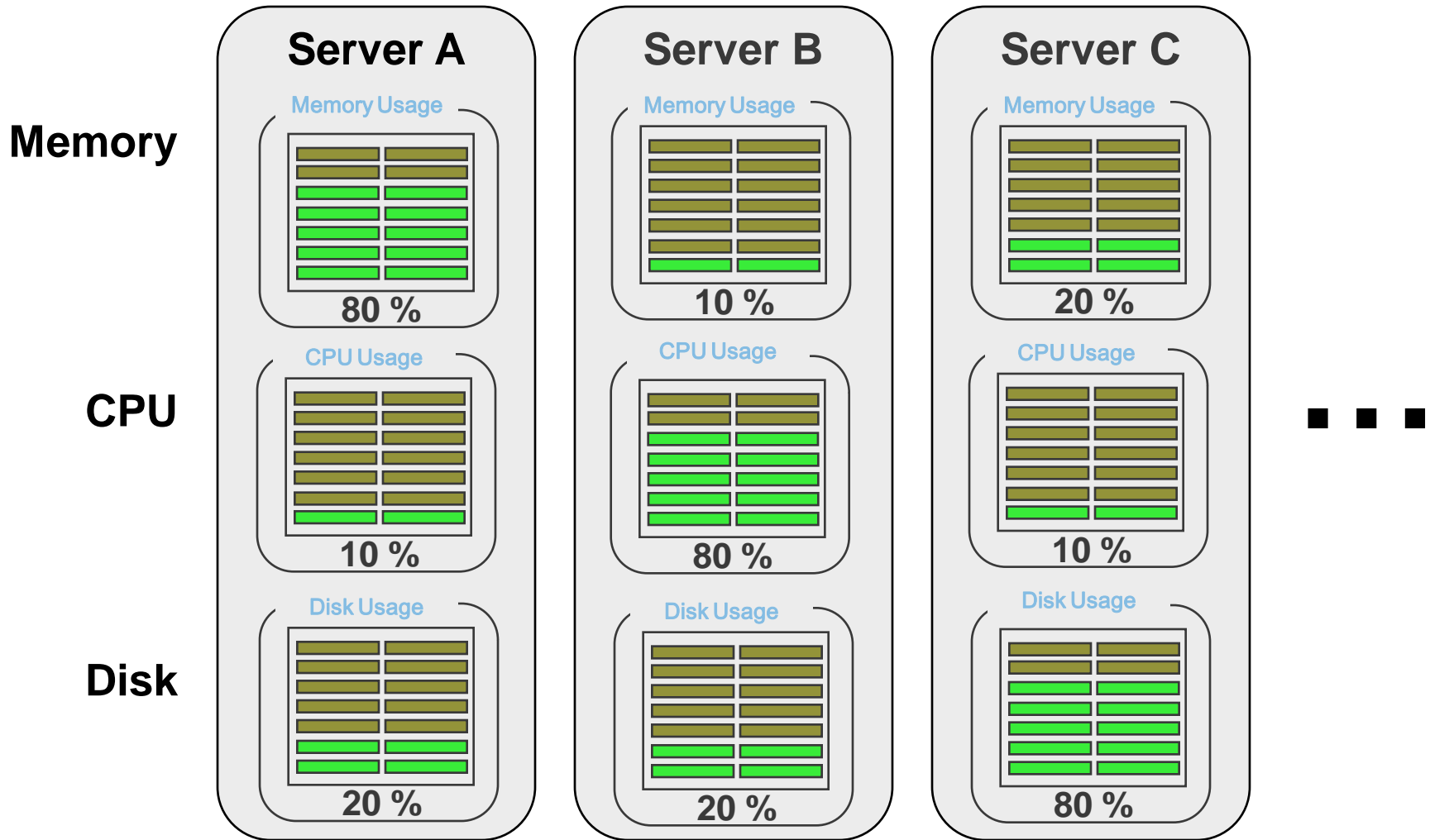
- Reduces Hub-and-spoke traffic

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Server Utilization

Typical Virtualization Scenario

Memory

CPU

Disk

Server A

Memory Usage
80 %

CPU Usage
10 %

Disk Usage
20 %

Server B

Memory Usage
10 %

CPU Usage
80 %

Disk Usage
20 %

Server C

Memory Usage
20 %

CPU Usage
10 %

Disk Usage
80 %

■ ■ ■

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Server Utilization
Typical SOA Scalability Scenario
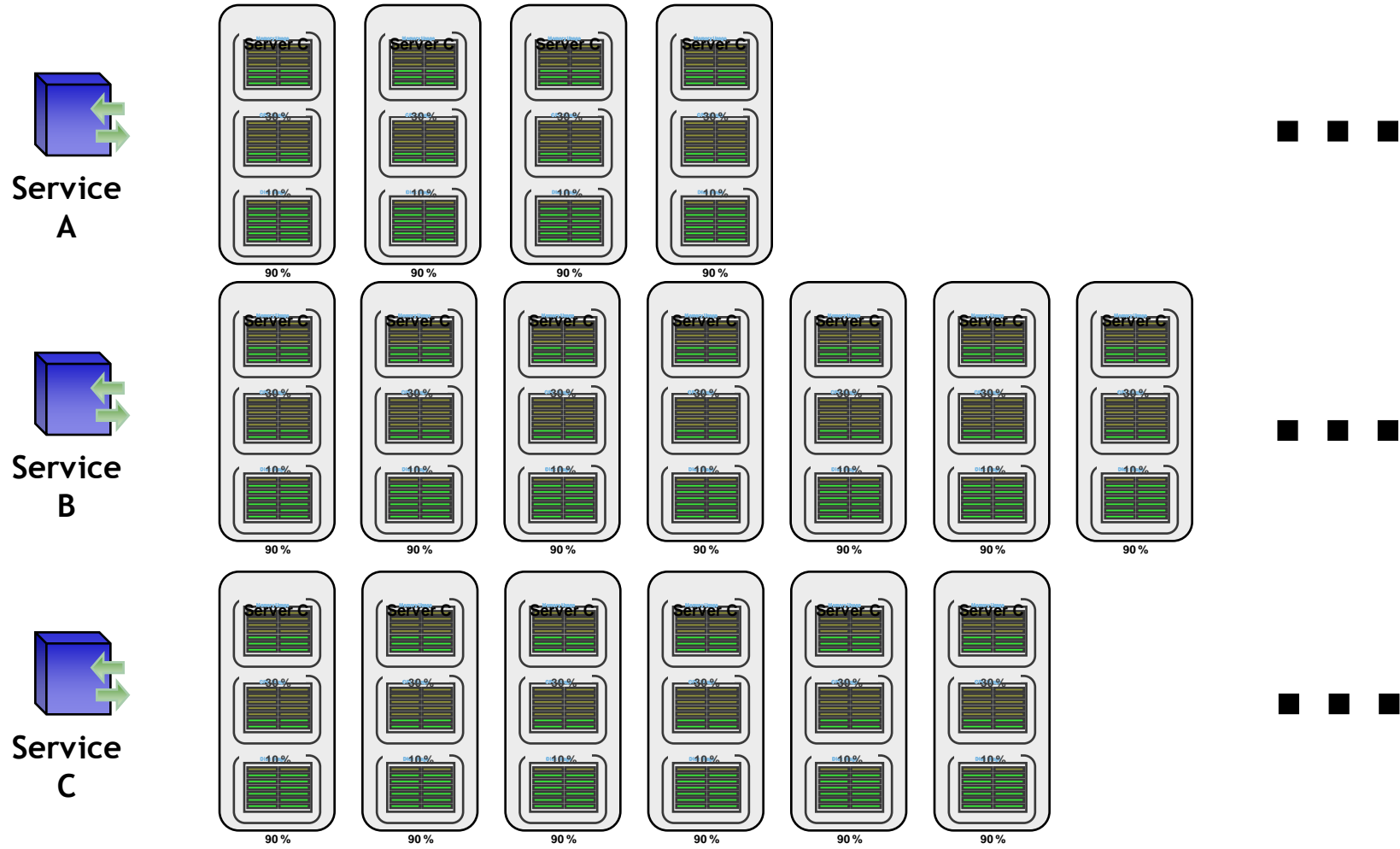
Server Utilization
SOA Grid

Memory

CPU

Disk

Server Z

Memory Usage

80 %

CPU Usage

80 %

Disk Usage

1 %

■ ■ ■
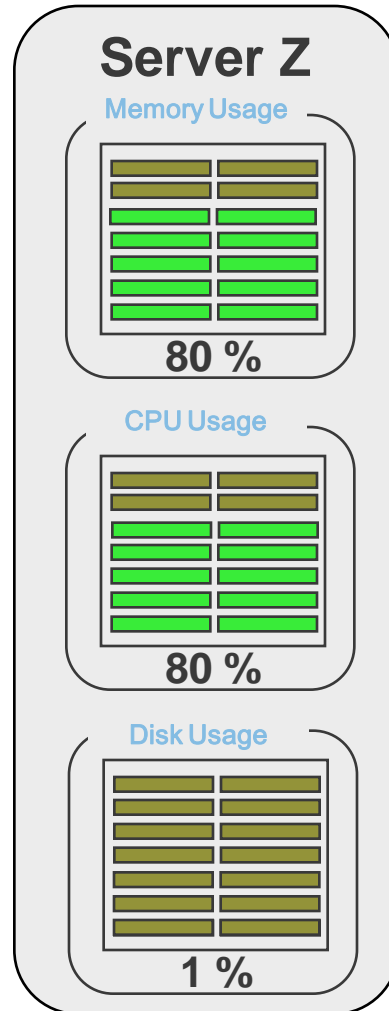
Scaling SOA

A new model for efficient resource utilization

BPEL Process

ESB

Service A
XSLT
Transformation

Service B
Application Logic

Data	Data	Data
Memory Usage	Memory Usage	Memory Usage
80 %	80 %	80 %

Logic	Logic	Logic
CPU Usage	CPU Usage	CPU Usage
80 %	80 %	80 %

Logic & Data	Logic & Data	Logic & Data
Memory Usage	Memory Usage	Memory Usage
50 %	50 %	50 %
CPU Usage	CPU Usage	CPU Usage
50 %	50 %	50 %

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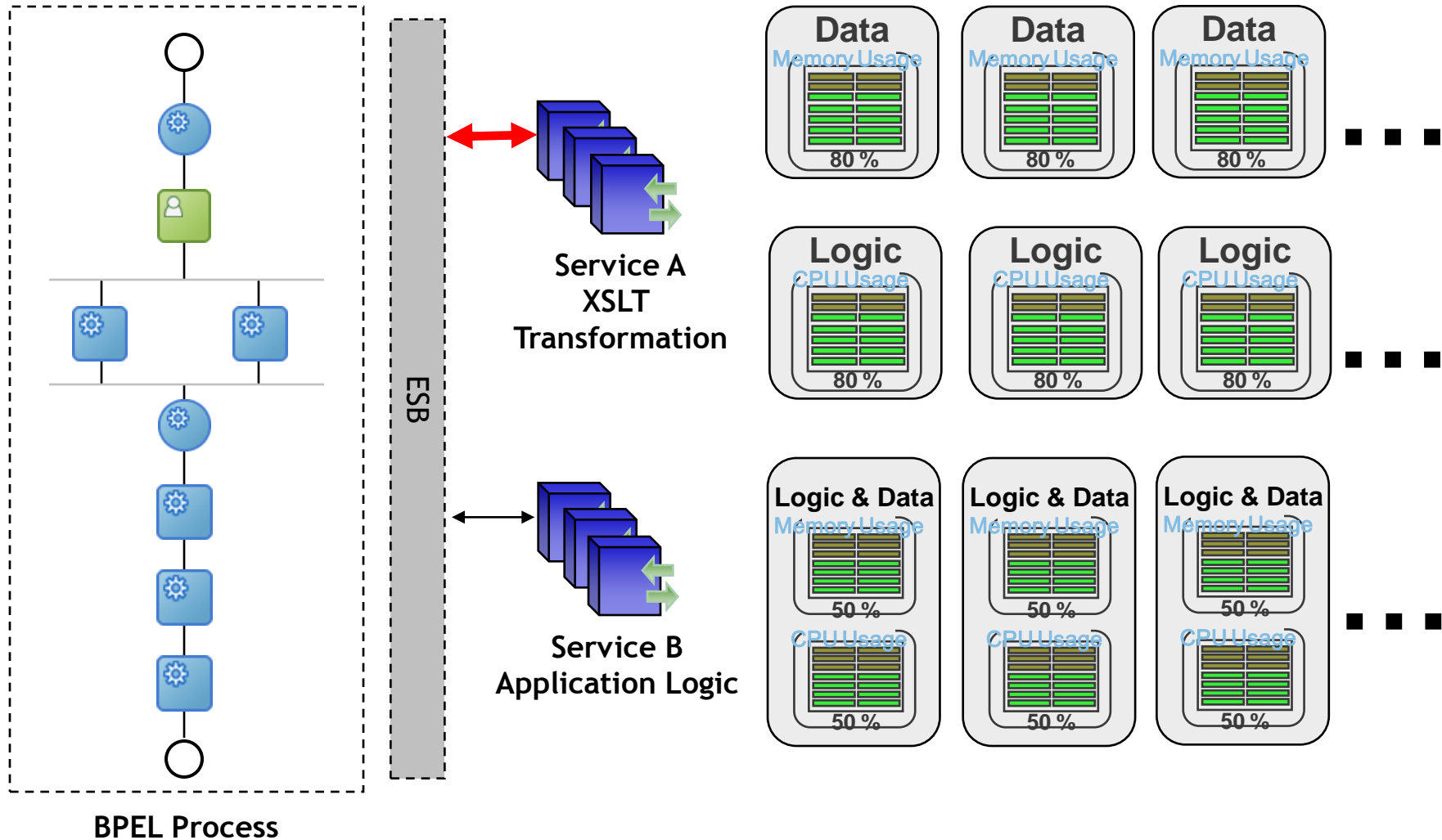
The SOA Grid

- State-aware continuous availability
- Predictable scalability
- Data Grid and Compute Grid
- Dramatic overall increase in performance and throughput
  - In memory data access speeds

For More Information

- **Dave Chappell Blog –**

  - **http://blogs.oracle.com/davidchappell**
- **SOA Magazine – SOA – Ready for Primetime: The Next Generation, Grid Enabled SOA**

  - http://www.soamag.com/I10/0907-1.asp
- **XTPP – Gartner Research ID # G00151768 – Massimo Pezzini**
- **Data Grid** –

  - http://www.oracle.com/products/middleware/coherence/index.html
- **General SOA Information** – http://www.oracle.com/technologies/soa/index.html