Apache Ignite™

A Backbone for Mircoservices-based Architectures

Denis Magda
GridGain Product Manager
Apache Ignite PMC

http://ignite.apache.org

#apacheignite

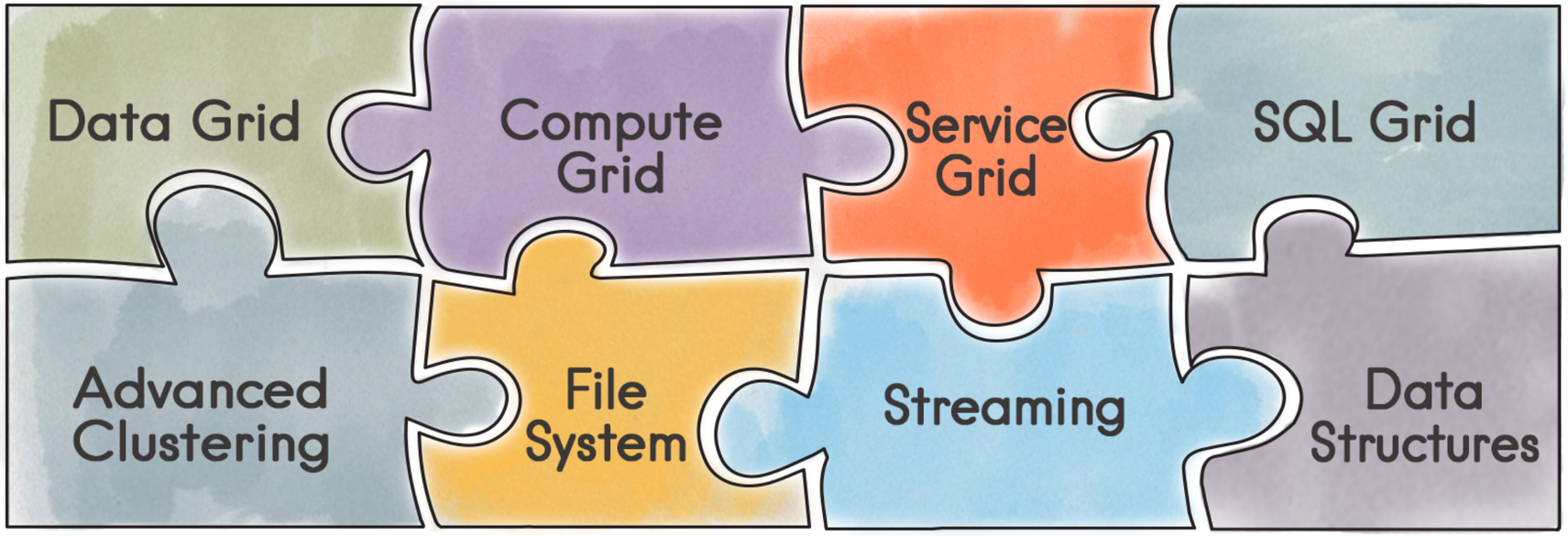
GridGain

Agenda

- Apache Ignite Service Grid
- Microservices-based Solution with Apache Ignite
  - Data Nodes
  - Service Nodes
  - Inter-communication
  - Internal and External Applications
  - Persistence
- Demo

Apache Ignite Service Grid

In-Memory Data Fabric: More Than Data Grid



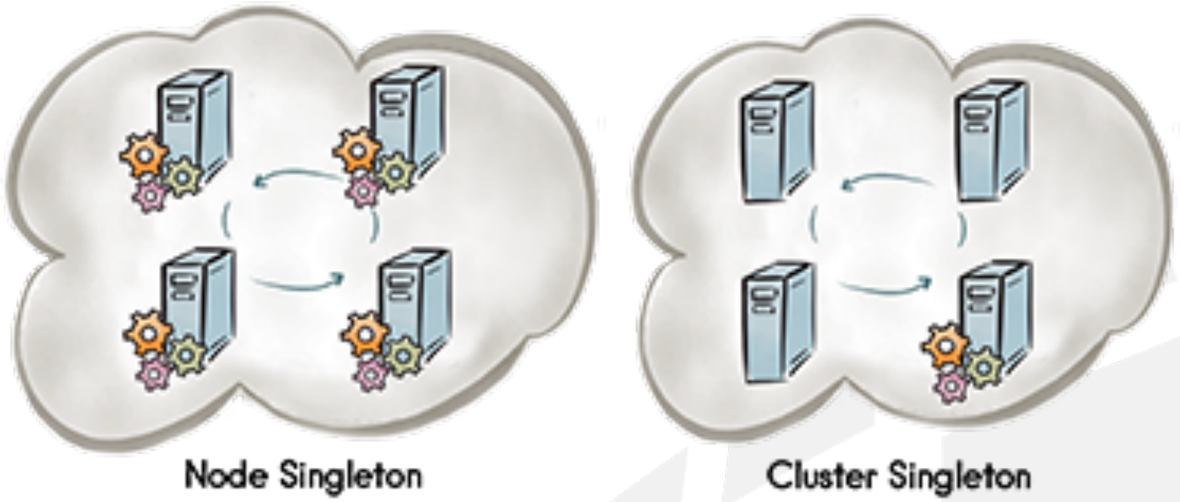
apache Ignite

Apache Ignite Service Grid

- Any Service: counter, ID generator, etc.
- Cluster Singleton
- Node Singleton
- Load Balancing
- Fault Tolerant

Deployment and Load Balancing

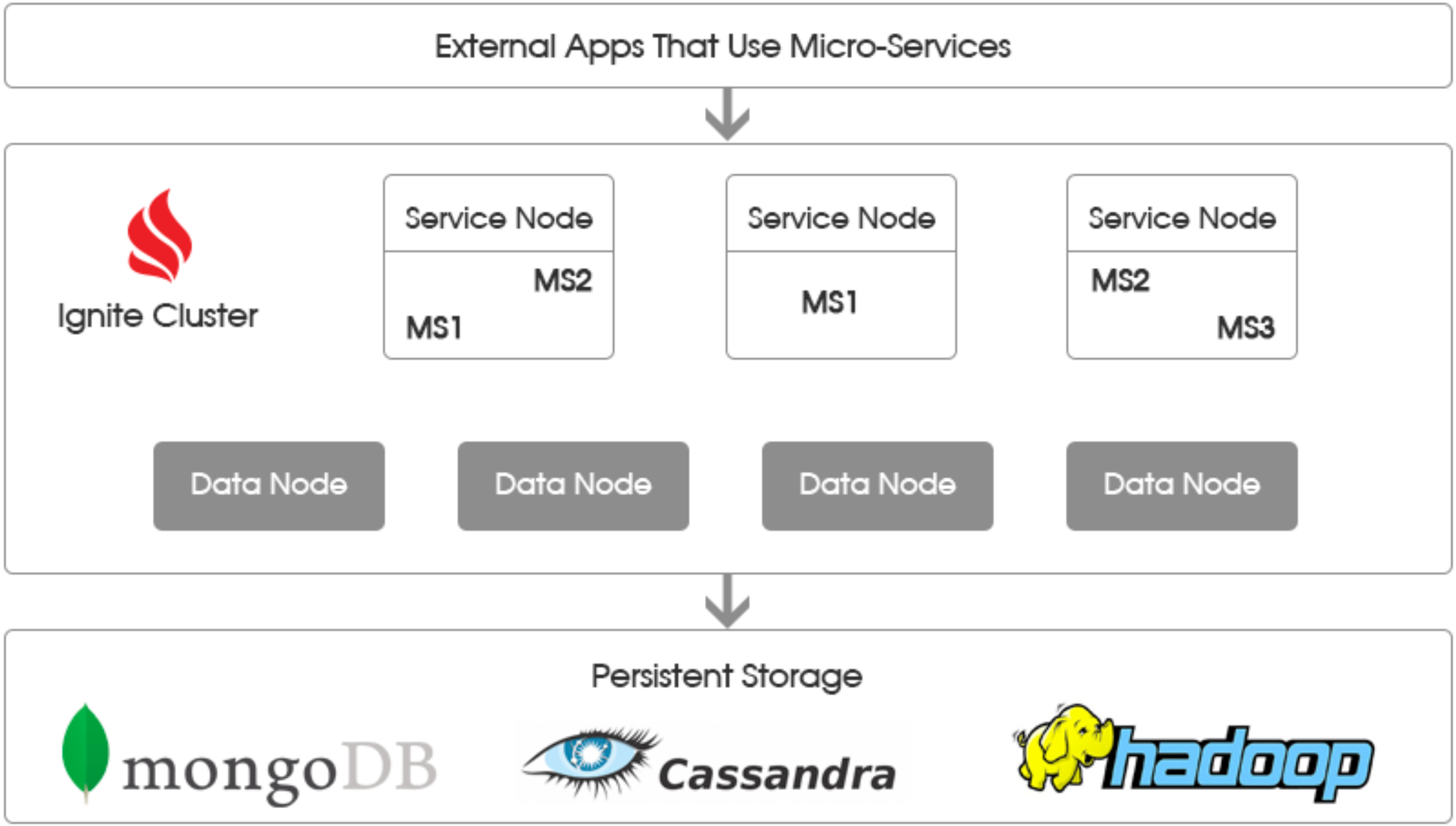
- Manageable Deployment
  - Node Filter
- Service Requests
  - Service Proxy
  - Sticky vs Non sticky
- Manageable Deployment + Proxy
  - No need to have DDLs on all the nodes
  - Basement for Microservices Architecture



Microservices-Based Solution With Apache Ignite

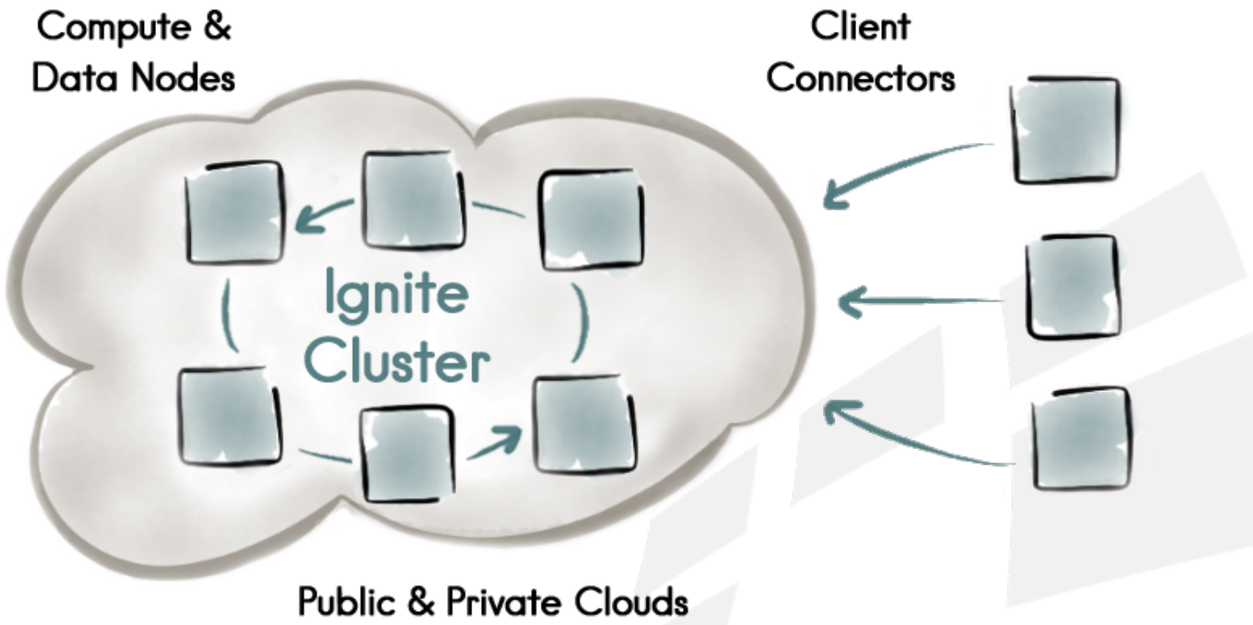
Microservices: Common Pitfalls

- Lifecycle Management
- Services Communication
- Load Balancing
- Fault-tolerance
- Scalability
  - Data Layer
  - Computational Layer



Microservices Architecture: Data Node

- Server node that
  - Stores data
  - Accepts queries
  - Accepts computations
- Plain Distributed Storage
  - No data model classes
  - No computations classes
  - No services classes
- Restarts-free
  - Apps and Services maintained separately

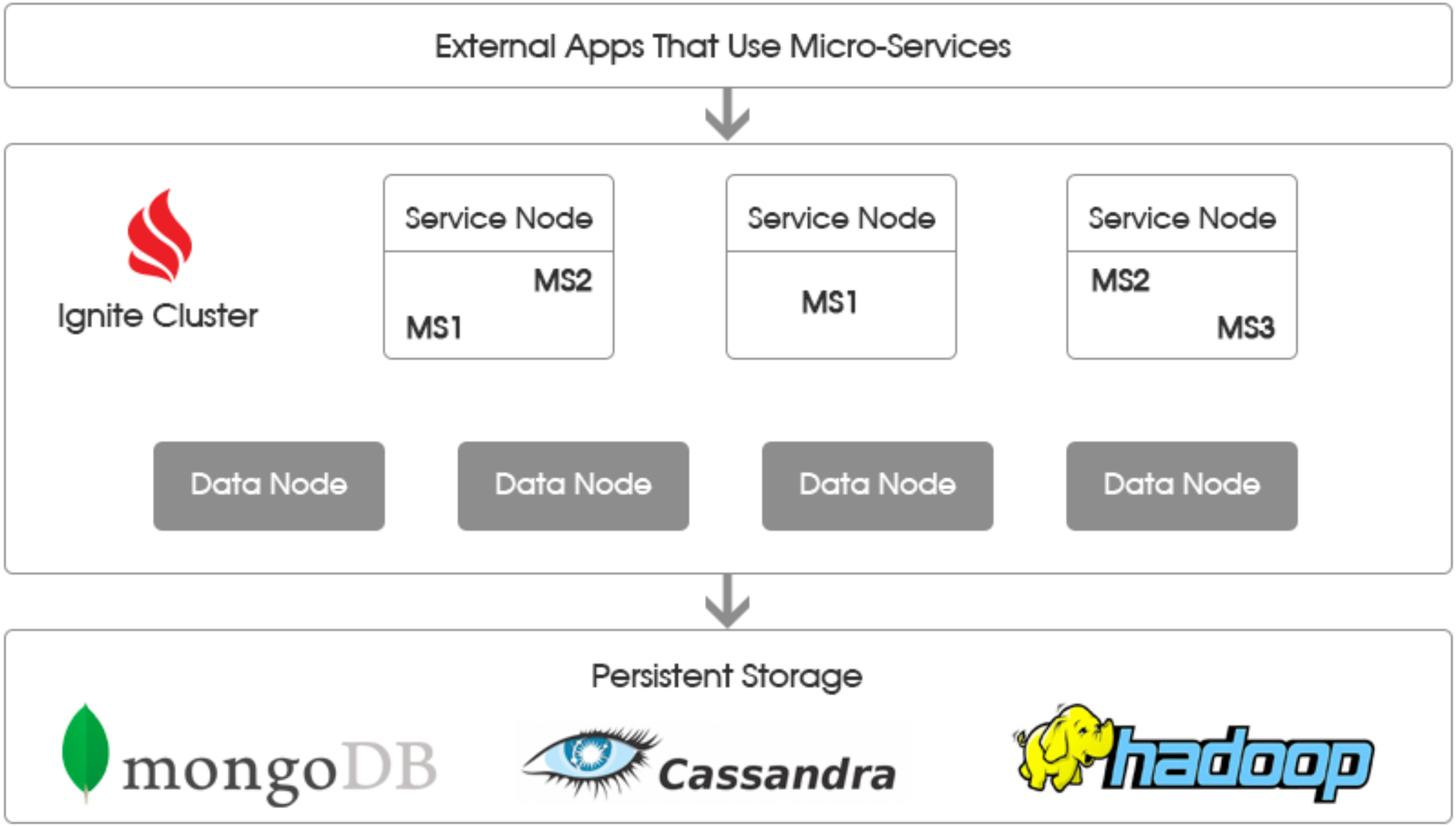


Data Node: Source Code Definition

```
public class DataNodeFilter implements IgnitePredicate<ClusterNode>{
    public boolean apply(ClusterNode node) {
        Boolean dataNode = node.attribute("data.node");

        return dataNode != null && dataNode;
    }
}
```

```
<property name="userAttributes">
    <map key-type="java.lang.String" value-type="java.lang.Boolean">
        <entry key="data.node" value="true"/>
    </map>
</property>
```

```
<bean class="org.apache.ignite.configuration.CacheConfiguration">
    <property name="name" value="vehicles"/>

    <property name="nodeFilter">
        <bean class="common.filters.DataNodeFilter"/>
    </property>
</bean>
```



Microservices Architecture: Service Node

- Server or client node that
  - A candidate for a service deployment
  - Handles service requests
- Hosts one or many services
  - Same type instances
  - Service A, Service B, etc.
- Updated separately
  - New service version released
  - Restarted as a group

Service Node: Source Code Definition

```java
public class VehicleServiceFilter implements IgnitePredicate<ClusterNode> {

    public boolean apply(ClusterNode node) {
        Boolean dataNode = node.attribute("vehicle.service.node");

        return dataNode != null && dataNode;
    }
}
```

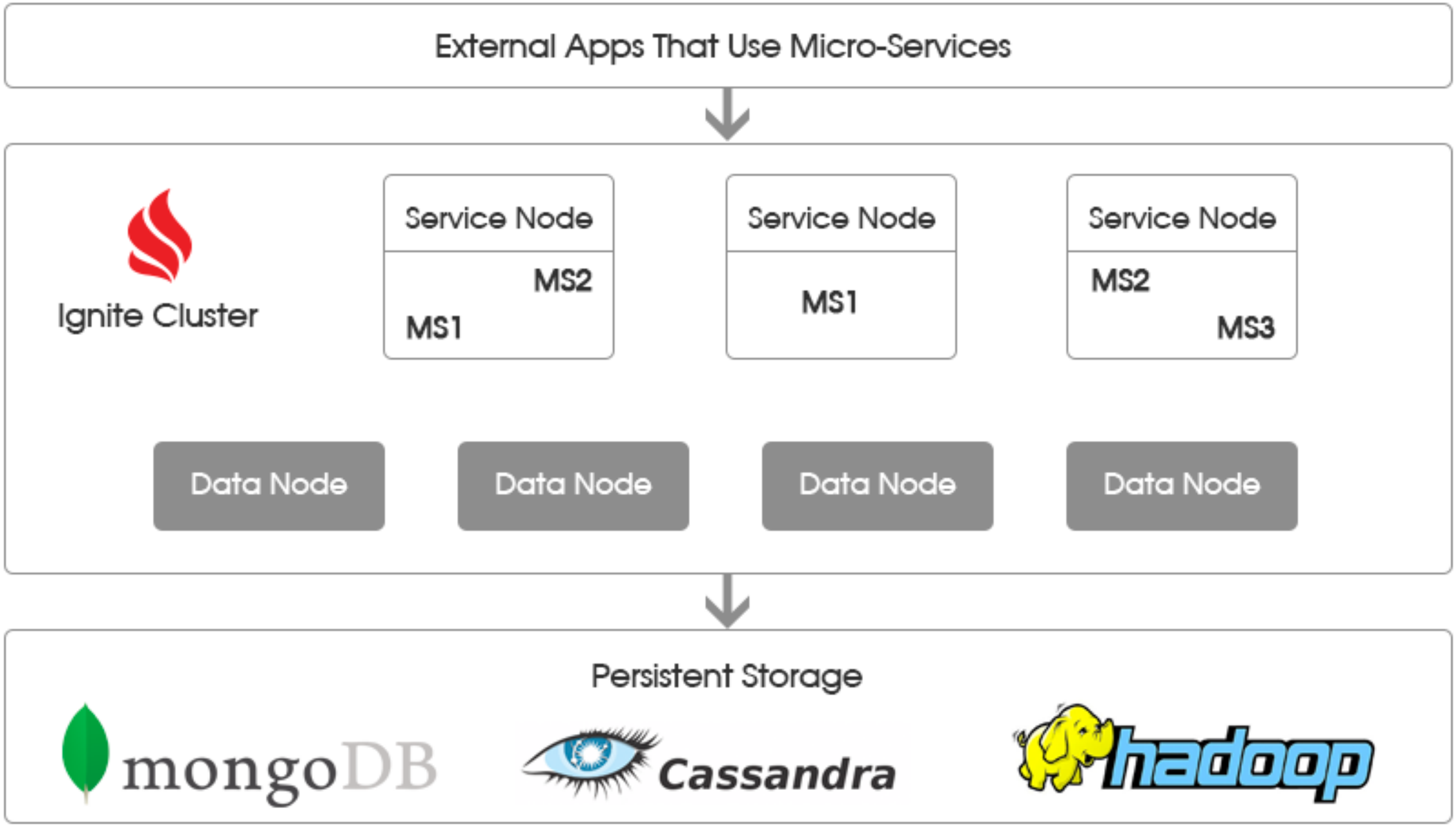
```xml
<property name="userAttributes">
    <map key-type="java.lang.String" value-type="java.lang.Boolean">
        <entry key="vehicle.service.node" value="true"/>
    </map>
</property>
```

```xml
<bean class="org.apache.ignite.services.ServiceConfiguration">
    <property name="name" value="VehicleService"/>

    <property name="nodeFilter">
        <bean class="common.filters.VehicleServiceFilter"/>
    </property>
</bean>
```

Microservices Architecture: Communication

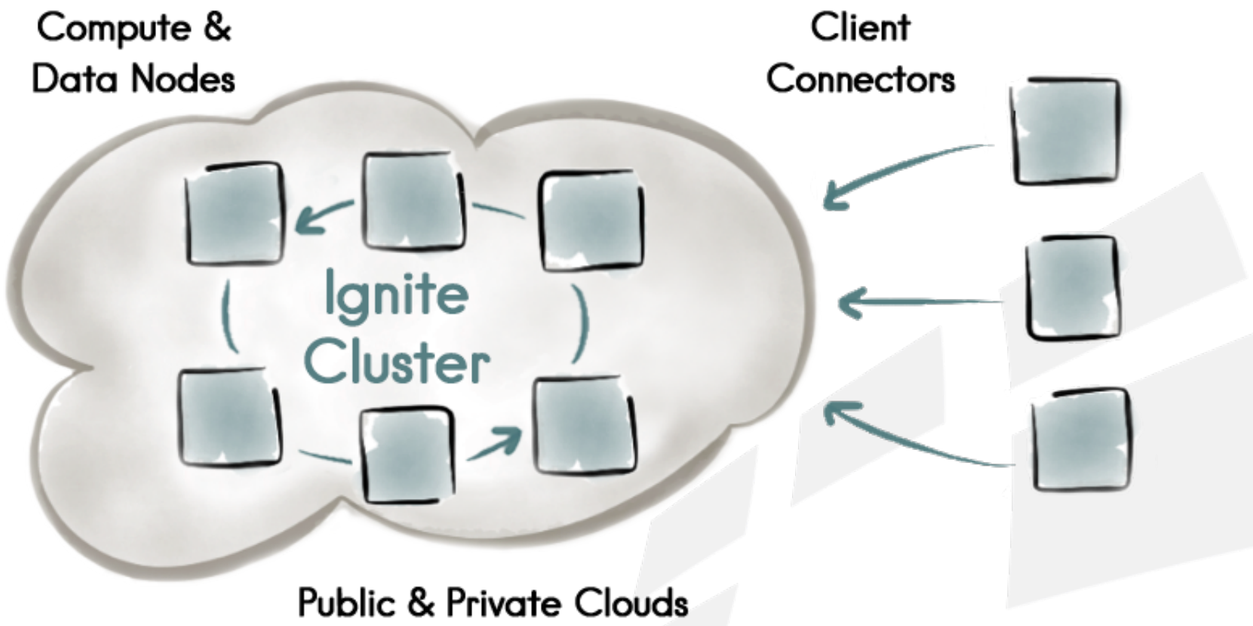
- In-cluster Communication
  - Service Grid API
- Service Interface
  - Service Nodes
  - Applications
- Service Implementation
  - Service Nodes
- External Communication Protocols
  - REST, Sockets, etc.

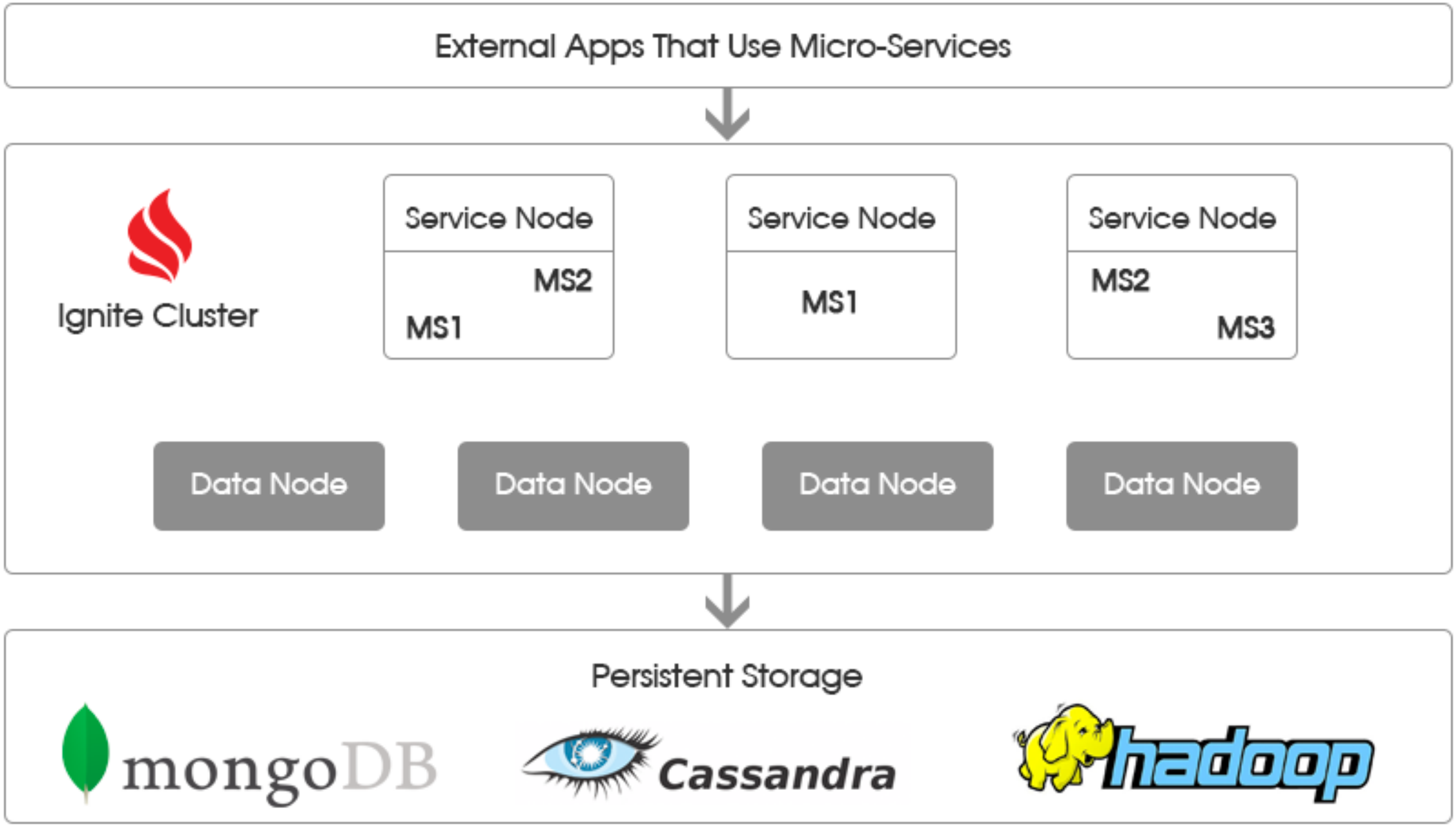
```java
public interface VehicleService extends Service {
    /** Service name */
    public static final String SERVICE_NAME = "VehicleService";

    /**
     * Calls the service to add a new vehicle.
     *
     * @param vehicleId Vehicle unique ID.
     * @param vehicle Vehicle instance to add.
     */
    public void addVehicle(int vehicleId, Vehicle vehicle);

    /**
     * Calls the service to get details for a specific vehicle.
     *
     * @param vehicleId Vehicle unique ID.
     */
    public Vehicle getVehicle(int vehicleId);

    /**
     * Calls the service to remove a specific vehicle.
     *
     * @param vehicleId Vehicle unique ID.
     */
    public void removeVehicle(int vehicleId);
}
```



Microservices Architecture: Applications

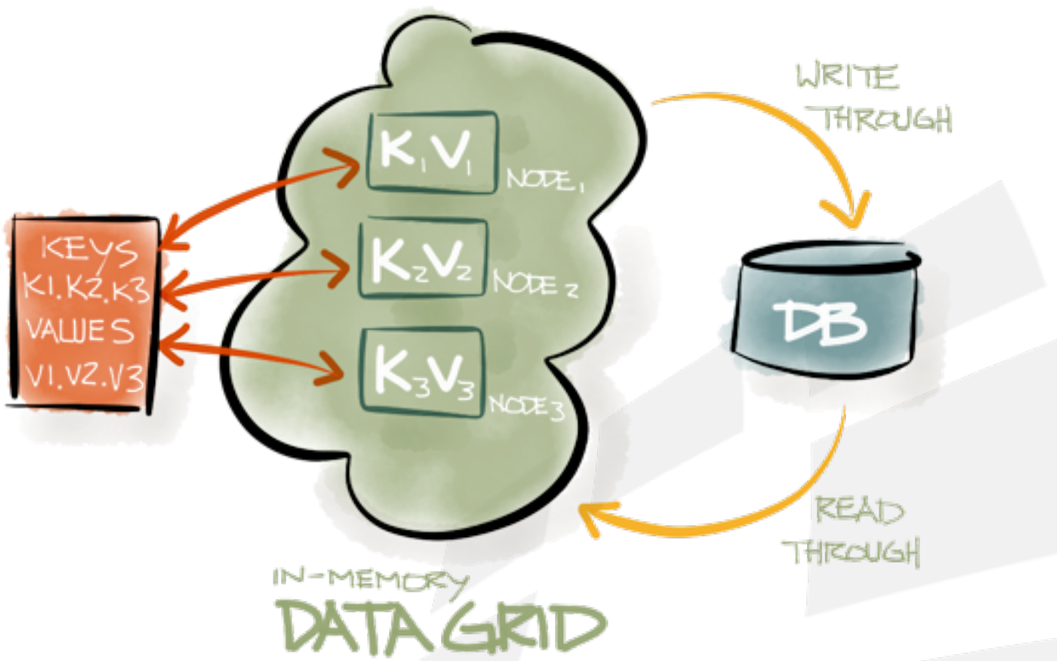
- "Internal" Applications
  - Connect via Ignite API
  - Use Service Grid API
- "External" Applications
  - Might not know about the cluster
  - REST, Sockets, etc.





Microservices Architecture: Persistent Storage

- Plugged-in to Data Nodes
  - RDBMS
  - Cassandra
  - Hadoop
  - Etc.
- Read-through
- Write-through
- Transactional
  - Depends on a storage type



Demo

Resources

- Blog posts:
  - https://www.gridgain.com/resources/blog/running-microservices-top-memory-data-grid-part-i
  - https://www.gridgain.com/resources/blog/microservices-top-memory-data-grid-part-ii
  - https://www.gridgain.com/resources/blog/microservices-top-memory-data-grid-part-iii
- GitHub Project With Templates:
  - https://github.com/dmagda/MicroServicesExample
- Service Grid:
  - https://apacheignite.readme.io/docs/service-grid

ANY QUESTIONS?

Thank you for joining us. Follow the conversation.

http://ignite.apache.org

 #apacheignite

GridGain