Systems Integration in the Cloud Era with Apache Camel

Kai Wähner, Principal Consultant
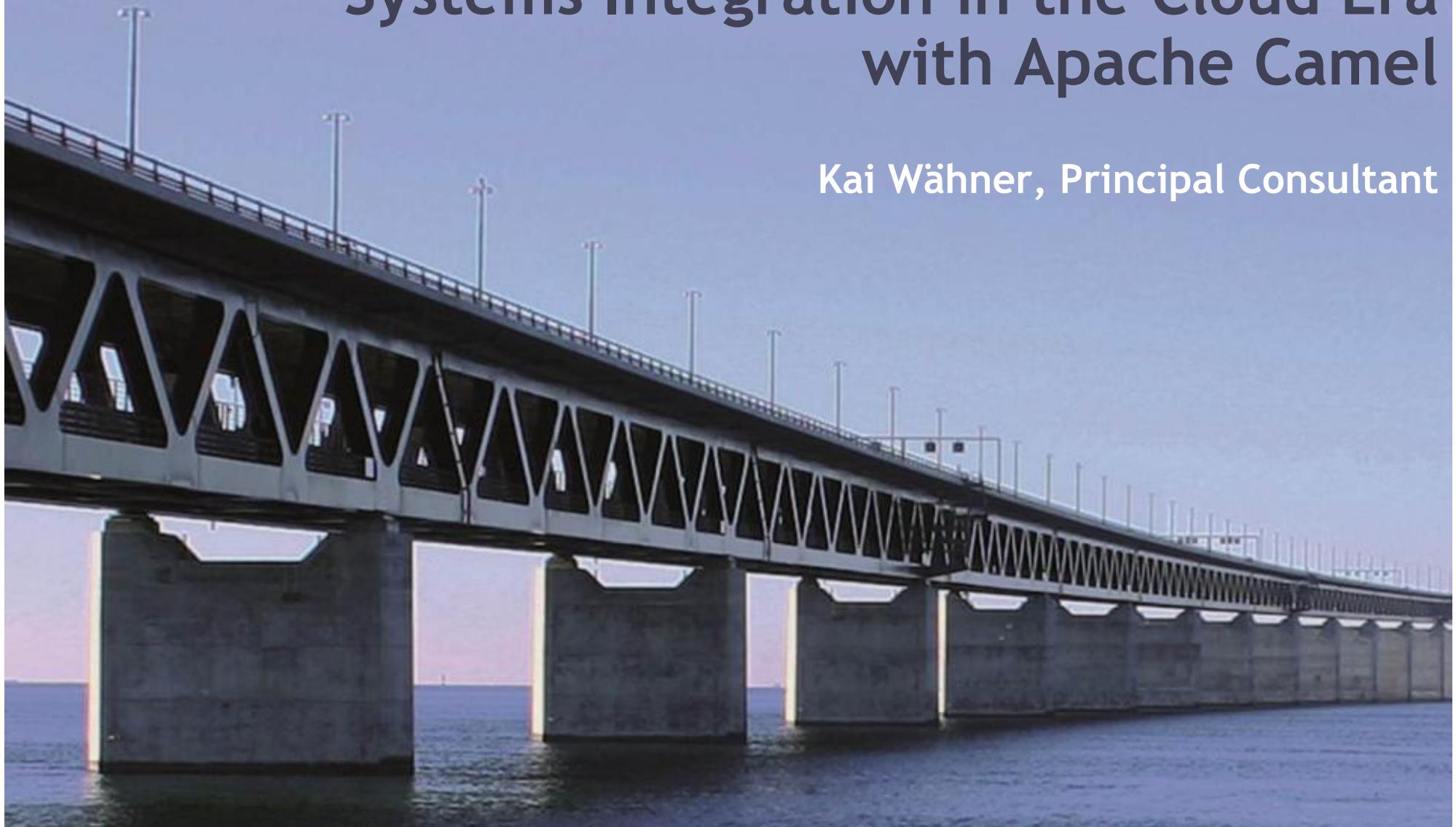
Kai Wähner

Consulting
Developing
Coaching
Speaking
Writing

Main Tasks

Requirements Engineering

Enterprise Architecture Management

Business Process Management

Architecture and Development of Applications

Service-oriented Architecture

Integration of Legacy Applications

Cloud Computing

Big Data

Contact

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Twitter: @KaiWaehner

Social Networks: Xing, LinkedIn

What is the Problem?

Growth

- Applications

- Interfaces

- Technologies

- Products

A new Era: Cloud Computing

Solution: Systems Integration

All Roads lead to Rome ...

Wishes

- Standardized Modeling
- Efficient Realization
- Automatic Testing

Systems Integration in the Cloud Era
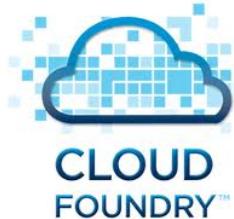
What is the Key Message?

Key Messages
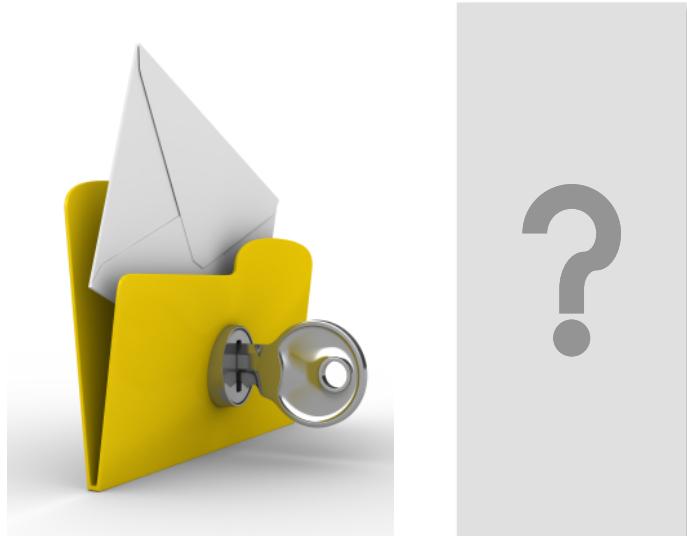
The Cloud already arrived, and must be integrated!

Key Messages
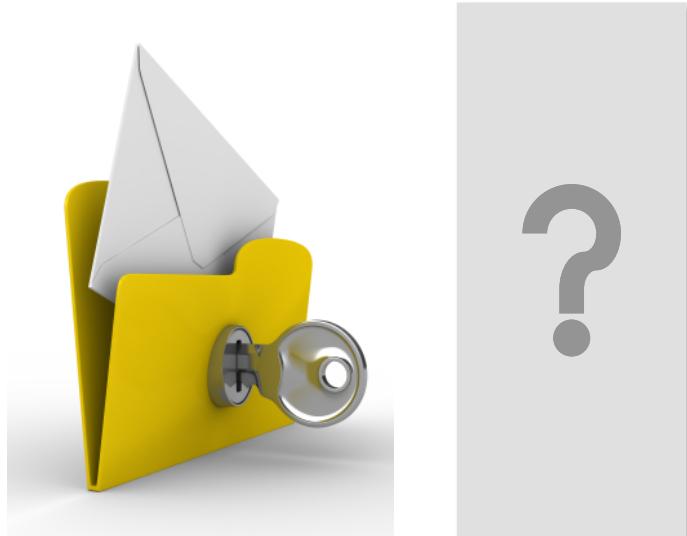
The Cloud already arrived, and must be integrated!

Cloud Integration is already possible!

Key Messages
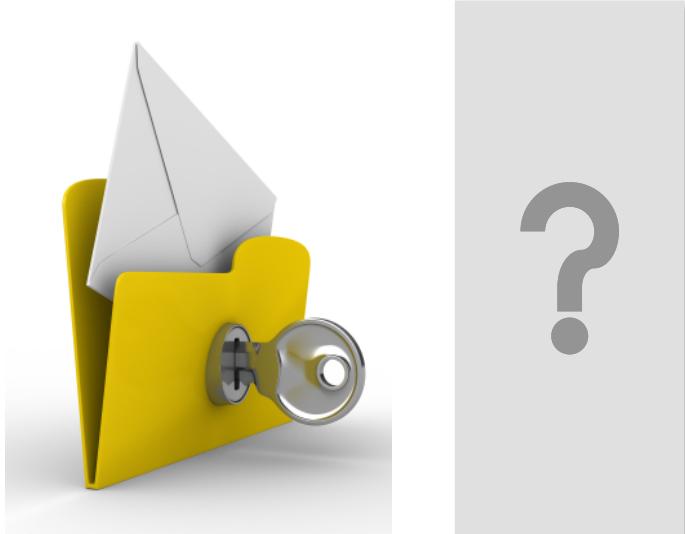
The Cloud already arrived, and must be integrated!

Cloud Integration is already possible!

**Apache Camel helps a lot!**

Agenda

1) Introduction to Cloud Computing

2) Introduction to Apache Camel

3) IaaS Integration (Amazon Web Services)

4) PaaS Integration (Google App Engine)

5) SaaS Integration (Salesforce)

6) Custom Cloud Components

Agenda

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Cloud Computing

On Premise	On Premise hosted	Infrastructure as a Service (IaaS)	Platform as a Service (PaaS)	Software as a Service (SaaS)
App	App	App	App	App
VM	VM	VM	VM	VM
Server	Server	Server	Server	Server
Storage	Storage	Storage	Storage	Storage
Network	Network	Network	Network	Network

Organisation has control

Control is shared

**Vendor has control**
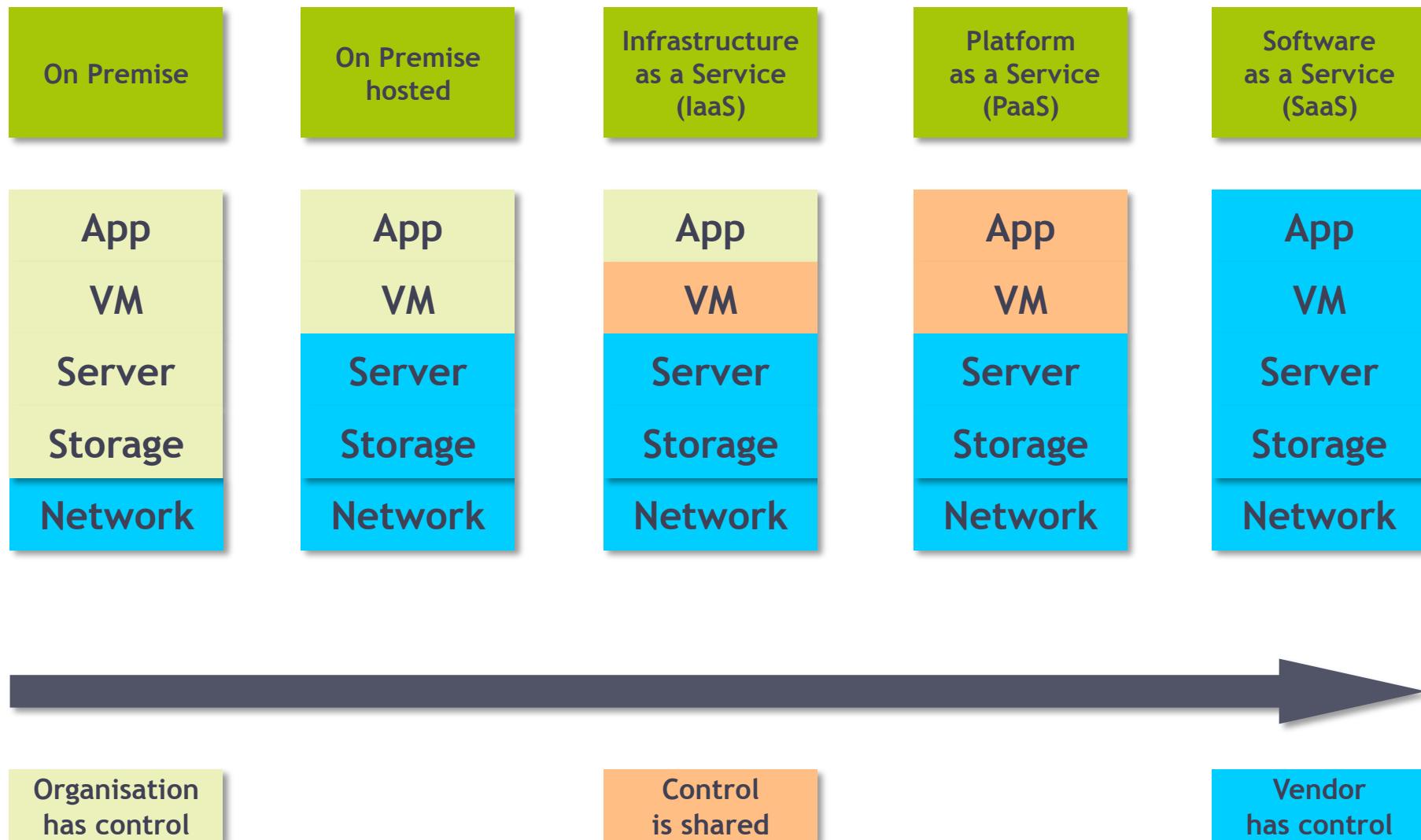
Every Vendor offers Cloud Products
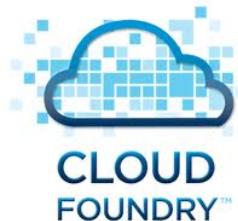
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Alternatives for Systems Integration

API

Integration
Framework

Enterprise Service Bus
(ESB)

Alternatives for Systems Integration

API

Integration
Framework

Enterprise Service Bus
(ESB)

Apache Camel vs. Spring Integration vs. Mule
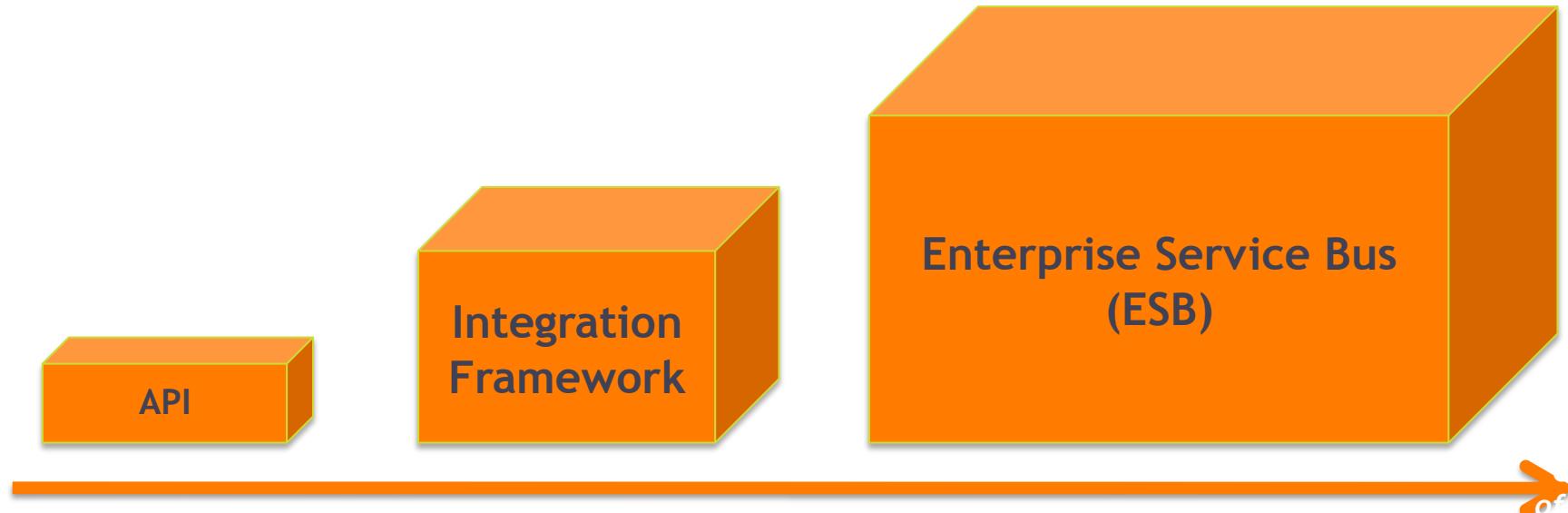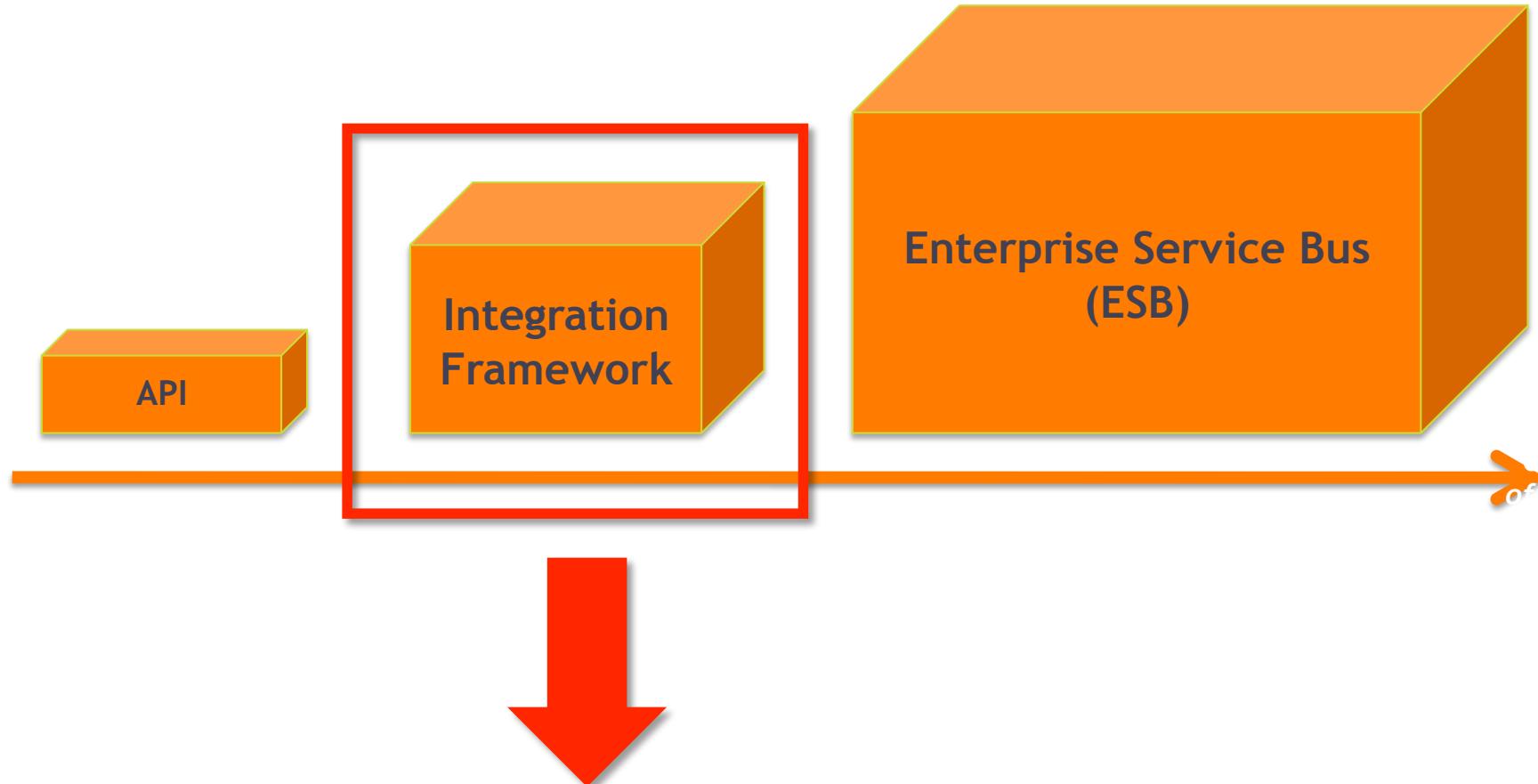
# Enterprise Integration Patterns (EIP)
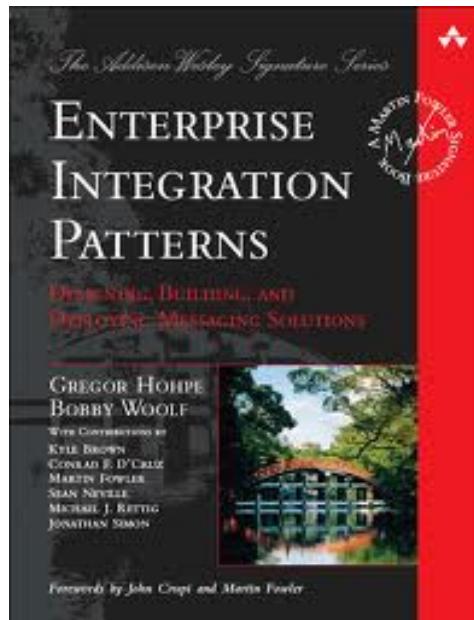
Apache Camel
Implements the EIPs

Enterprise Integration Patterns (EIP)
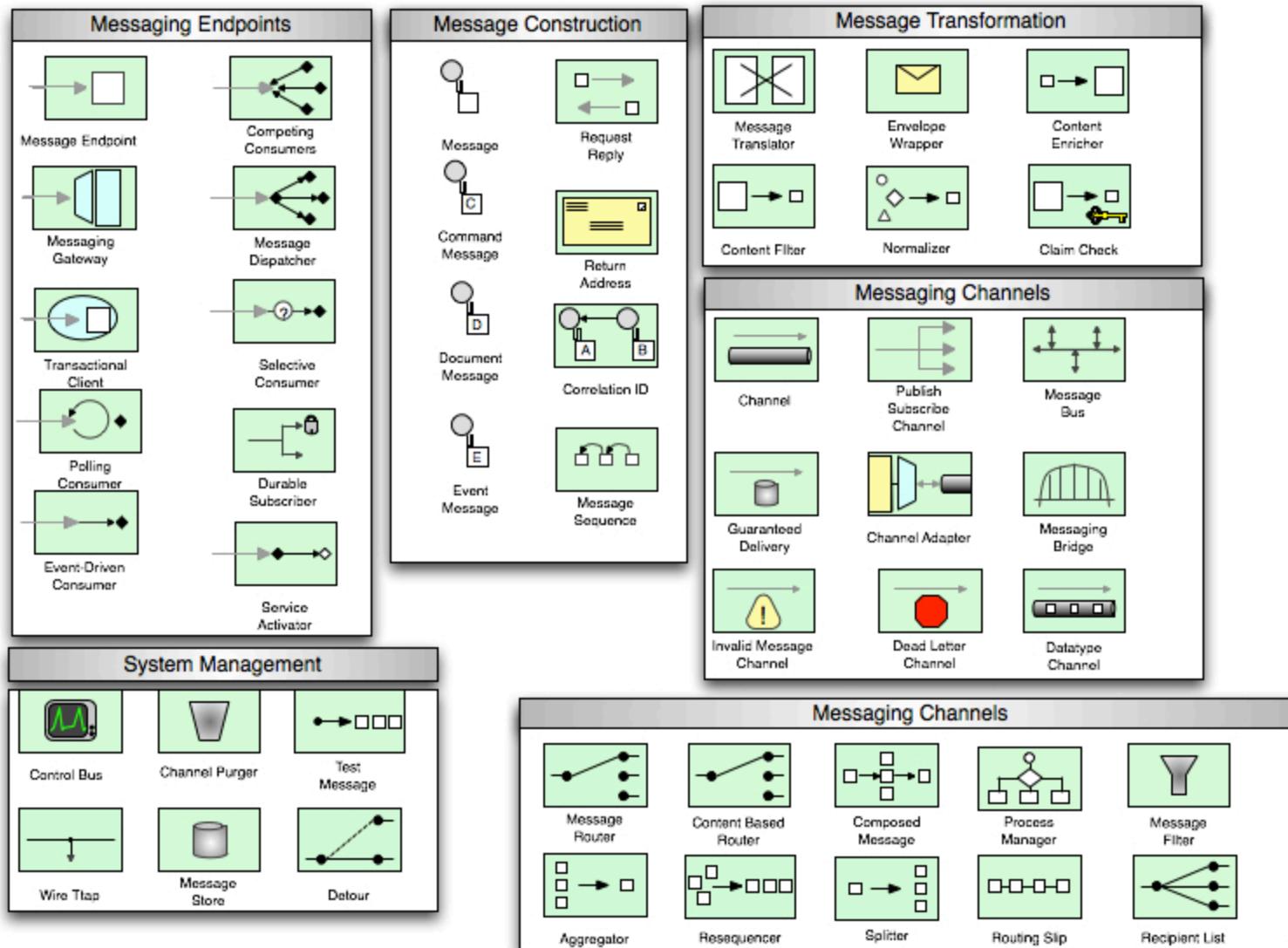
Enterprise Integration Patterns (EIP)
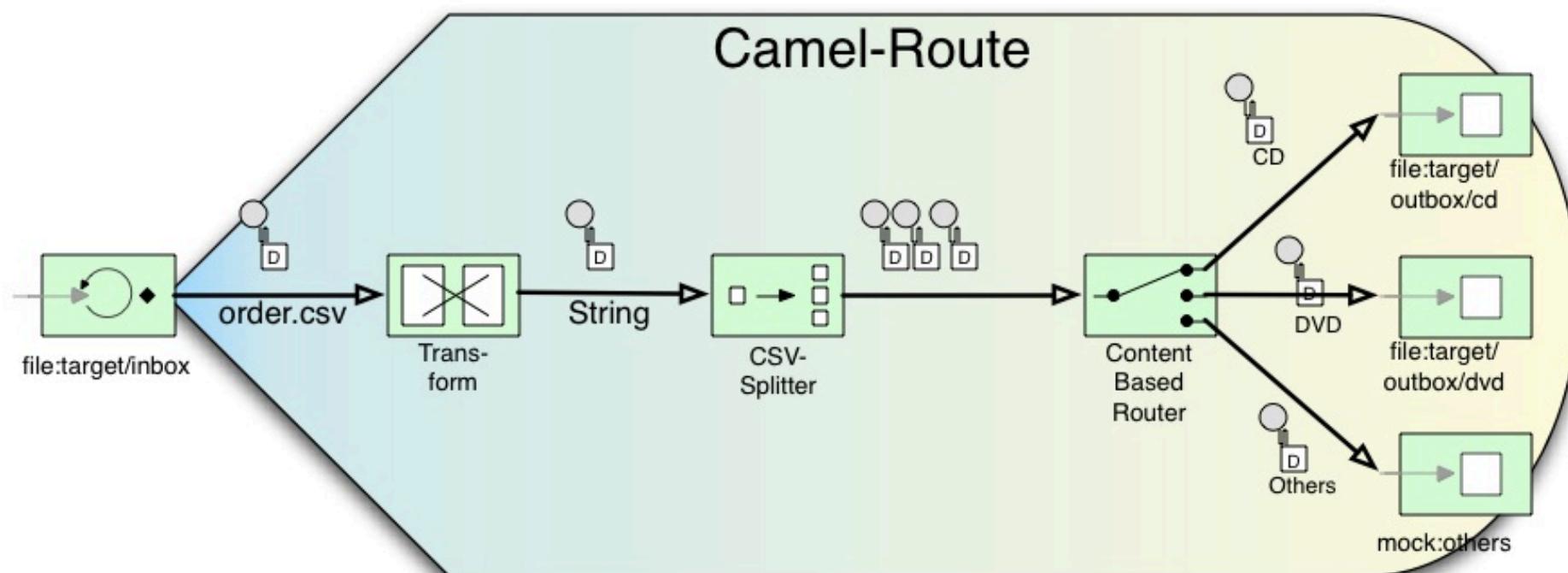
Architecture
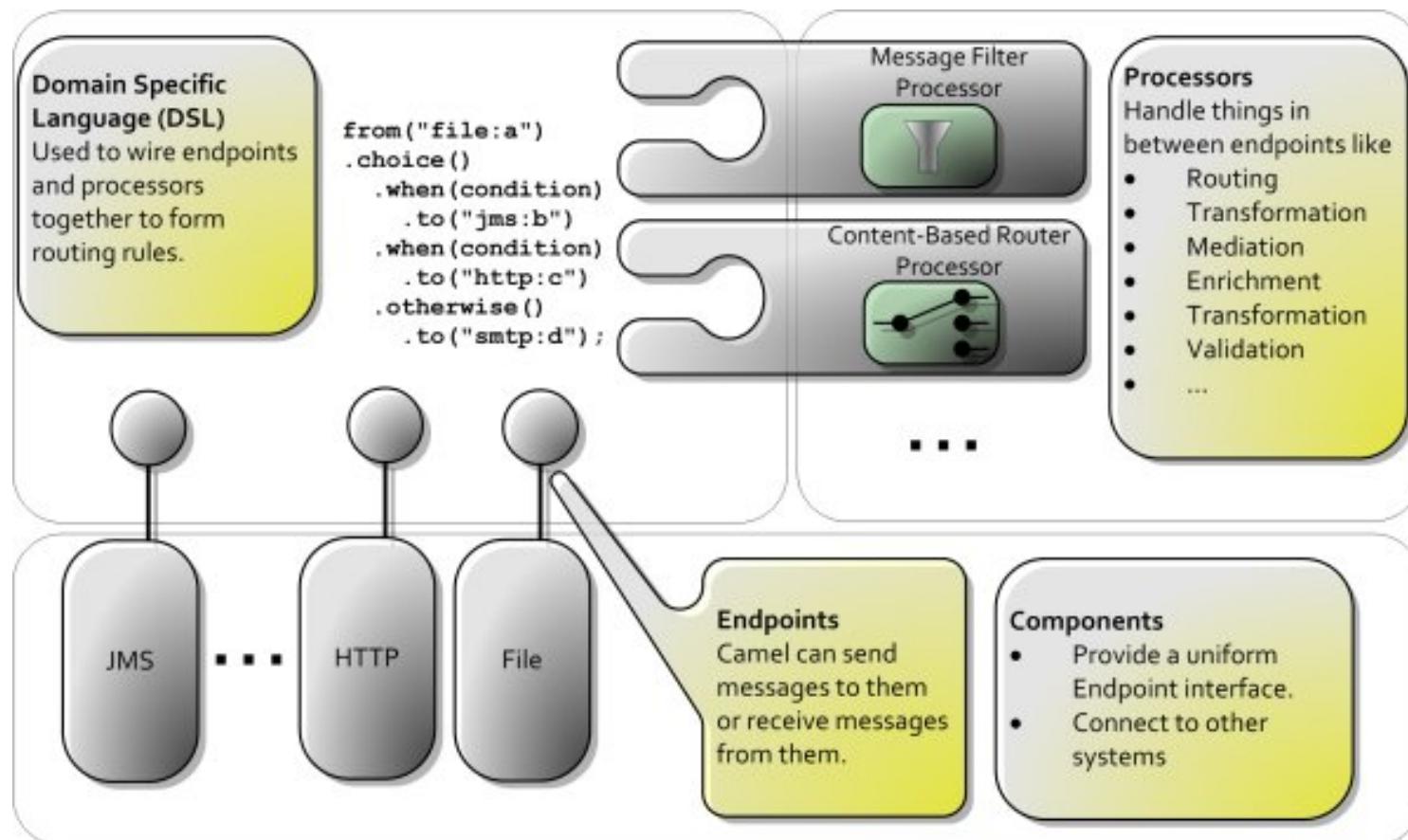
Choose your favorite DSL

Java

XML

Scala

Groovy

Kotlin
by JetBrains
(not production-ready yet)

Choose your required Components

SQL
TCP
SMTP
JMS
Netty
Jetty
RMI
FTP
Lucene
JDBC
EJB
Bean-Validation
MQ
IRC
JMX
Quartz
RSS
AMQP
Atom
Log
AWS-S3
HTTP
XSLT
LDAP
File
Akka
Many many more
CXF
Custom Components
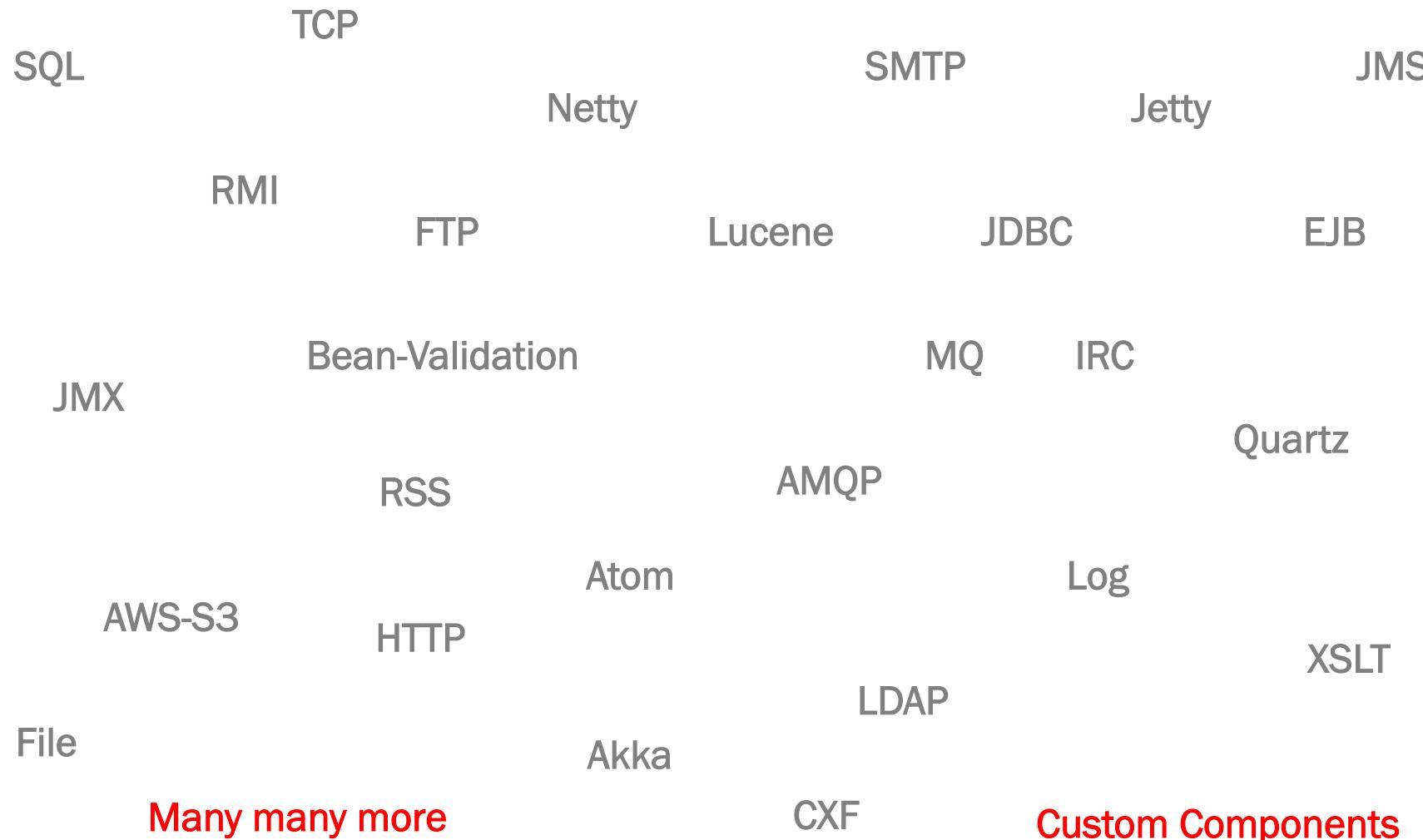
Deploy it wherever you need

Standalone

Application Server

Web Container

Spring Container

OSGi

Cloud

Enterprise-ready

- Open Source
- Scalability
- Error Handling
- Transaction
- Monitoring
- Tooling
- Commercial Support

Live Demo

Apache Camel in Action

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5) SaaS Integration (Salesforce)

6) Custom Cloud Components

Cloud Computing
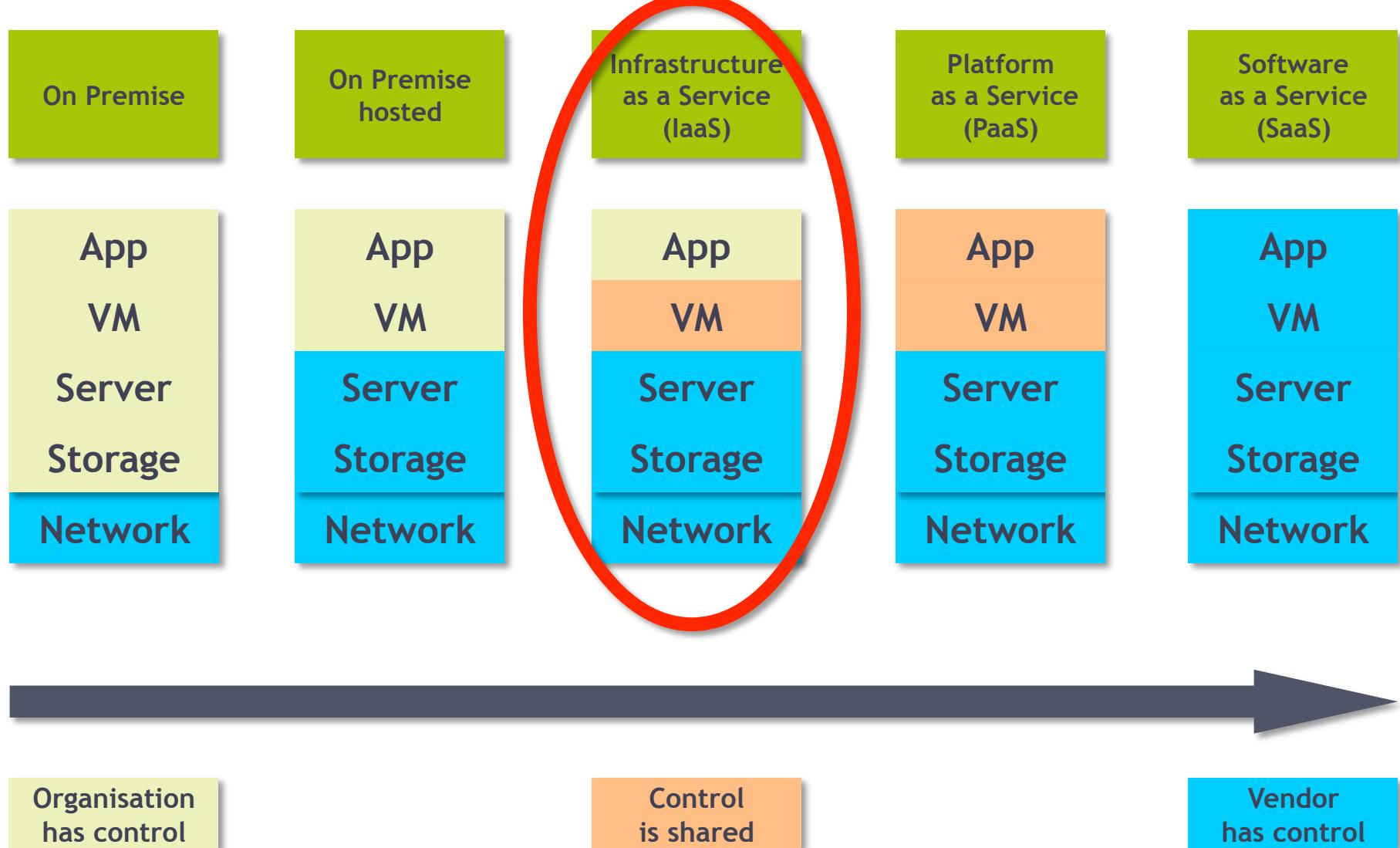
Infrastructure as a Service (IaaS)

IaaS Concepts (Example: AWS)

Compute
Amazon Elastic Compute Cloud (EC2)
Amazon Elastic MapReduce (EMR)

Storage
Amazon Simple Storage Service (S3)
Amazon Elastic Block Store (EBS)
SimpleDB (SDB)

Database
Amazon Relational Database Service (RDS)
Amazon DynamoDB (DDB)
Amazon ElastiCache

Application Services
Amazon Simple Workflow Service (SWF)
Amazon Simple Queue Service (SQS)
Amazon Simple Notification Service (SNS)
Amazon Simple Email Service (SES)

Many more …

Code Example – AWS S3 (Java API)

```java
AmazonS3 s3 = new AmazonS3Client(new PropertiesCredentials(
        S3Sample.class.getResourceAsStream("AwsCredentials.properties")));

String bucketName = "my-first-s3-bucket-" + UUID.randomUUID();
String key = "MyObjectKey";

try {

    s3.createBucket(bucketName);
    s3.putObject(new PutObjectRequest(bucketName, key, createSampleFile()));

    S3Object object = s3.getObject(new GetObjectRequest(bucketName, key));

    ObjectListing objectListing = s3.listObjects(new ListObjectsRequest()
            .withBucketName(bucketName)
            .withPrefix("My"));

    s3.deleteObject(bucketName, key);
    s3.deleteBucket(bucketName);

} catch (AmazonServiceException ase) {
  // error handling...
} catch (AmazonClientException ace) {
  // error handling...
}
```

Code Example – Camel AWS Component

```
// Producer
from("direct:startToS3")
    .setHeader(S3Constants.KEY, simple("order.txt"))
    .to("aws-s3://myBucket?accessKey=" + a + "&secretKey= " + s)


// Consumer
from("aws-s3://myBucket?accessKey=" + a + "&secretKey=" + s)
    .to("log:S3logging")
```

Live Demo
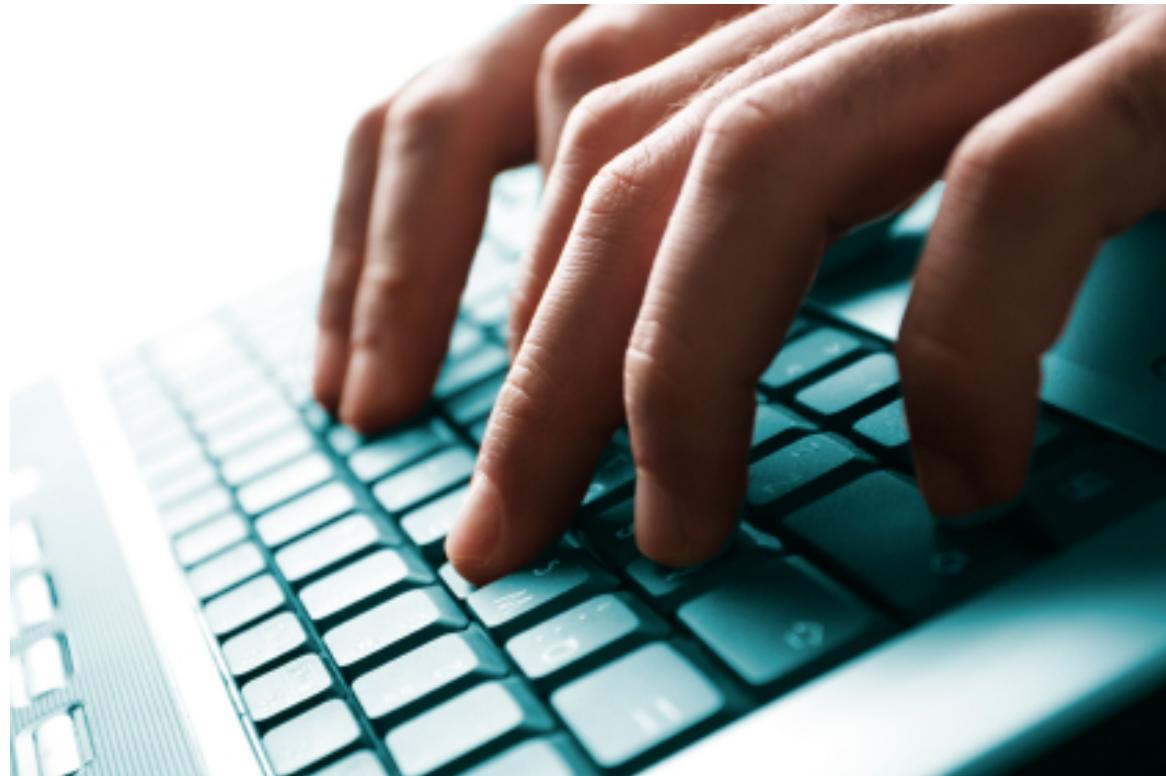
IaaS Integration in Action

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5) SaaS Integration (Salesforce)

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Cloud Computing

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Organisation has control	Control is shared	Vendor has control
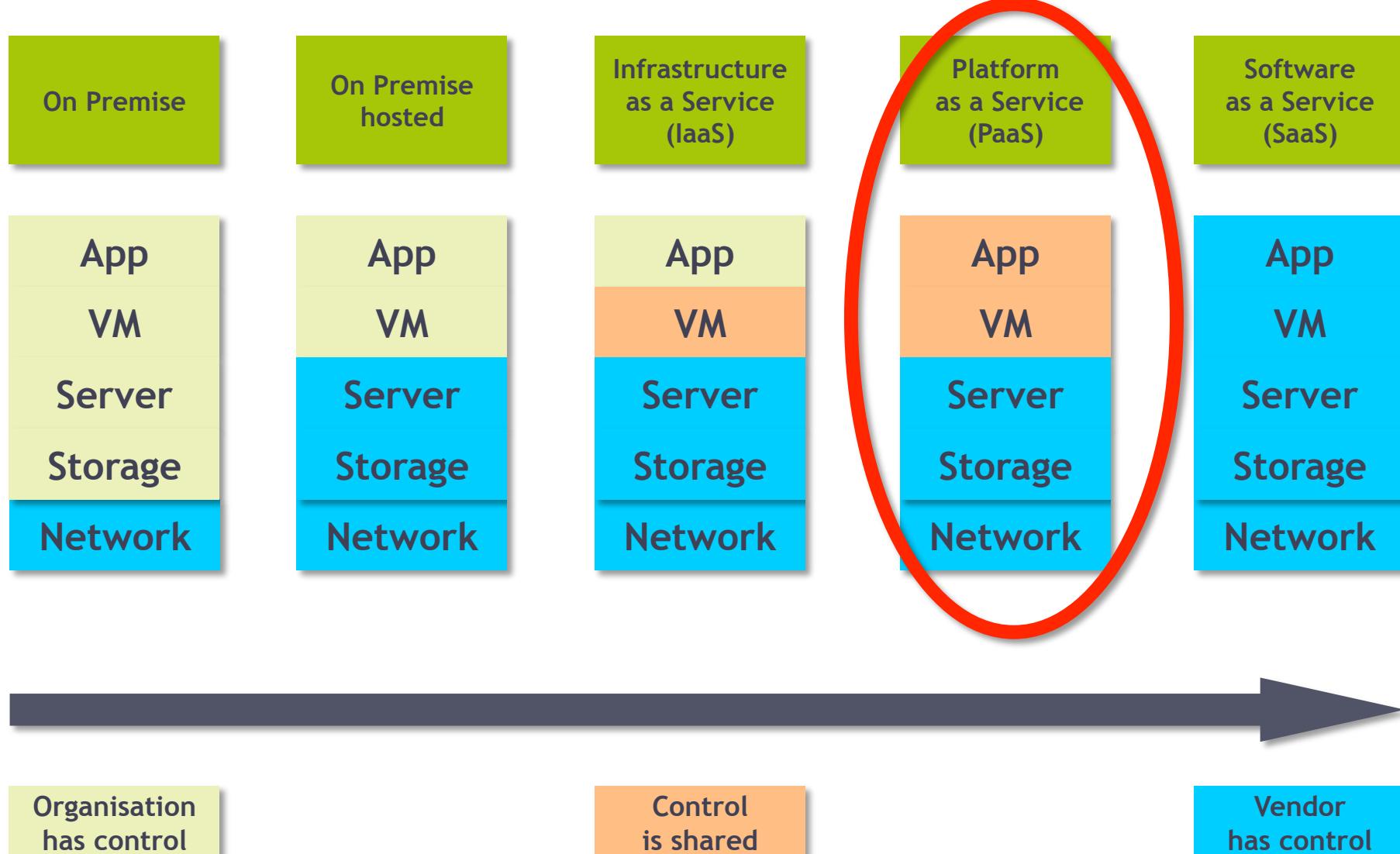
Platform as a Service (PaaS)

PaaS Concepts (Example: GAE)
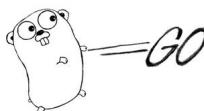
Application Deployment
Easy Deployment
Automatic Scaling

Development Restrictions
JRE Class White List

Workarounds for Frameworks

No „naked" Domains

No „write once run everywhere"

Quotas and Limits

Services
Push Queue
Pull Queue
URL Fetch
Accounts
Mail
Memcache
XMPP
Images
Datastore
Cloud Storage
Cloud SQL

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Hint
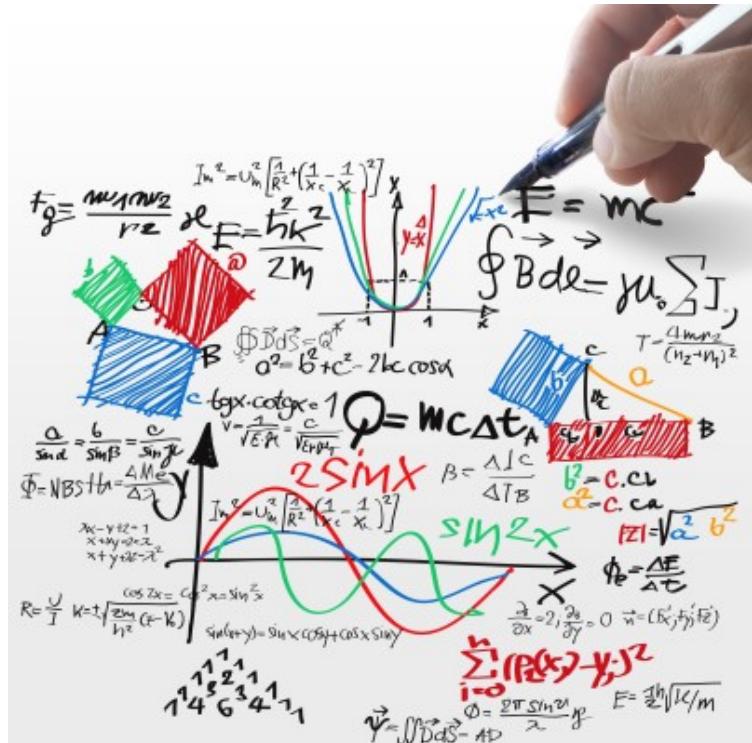
Google App Engine is a complex scenario due to its many restrictions!

Other „more open" PaaS solutions such as Jelastic or Amazon Beanstalk are easier to use and integrate...

Code Example – Google App Engine (Java API)

```java
public class GAEJCreateTaskServlet extends HttpServlet {
        public void doGet(HttpServletRequest req, HttpServletResponse resp) throws IOException {
        String strCallResult = "";
        resp.setContentType("text/plain");
        try {

                String strEmailId = req.getParameter("emailid");

                if (strEmailId == null) throw new Exception ("Email Id field cannot be empty.");
                strEmailId = strEmailId.trim();
                if (strEmailId.length() == 0) throw new Exception("Email Id field cannot be empty.");
                Queue queue = QueueFactory.getQueue("subscription-queue");
                queue.add(TaskOptions.Builder.url("signupsubscriber")
                            .param("emailid",strEmailId));

                strCallResult = "Successfully created a Task in the Queue";
                resp.getWriter().println(strCallResult);
                }

        catch (Exception ex) {
                strCallResult = "Fail: " + ex.getMessage();
                resp.getWriter().println(strCallResult);
    } }}
```

Code Example – Camel GAE Component
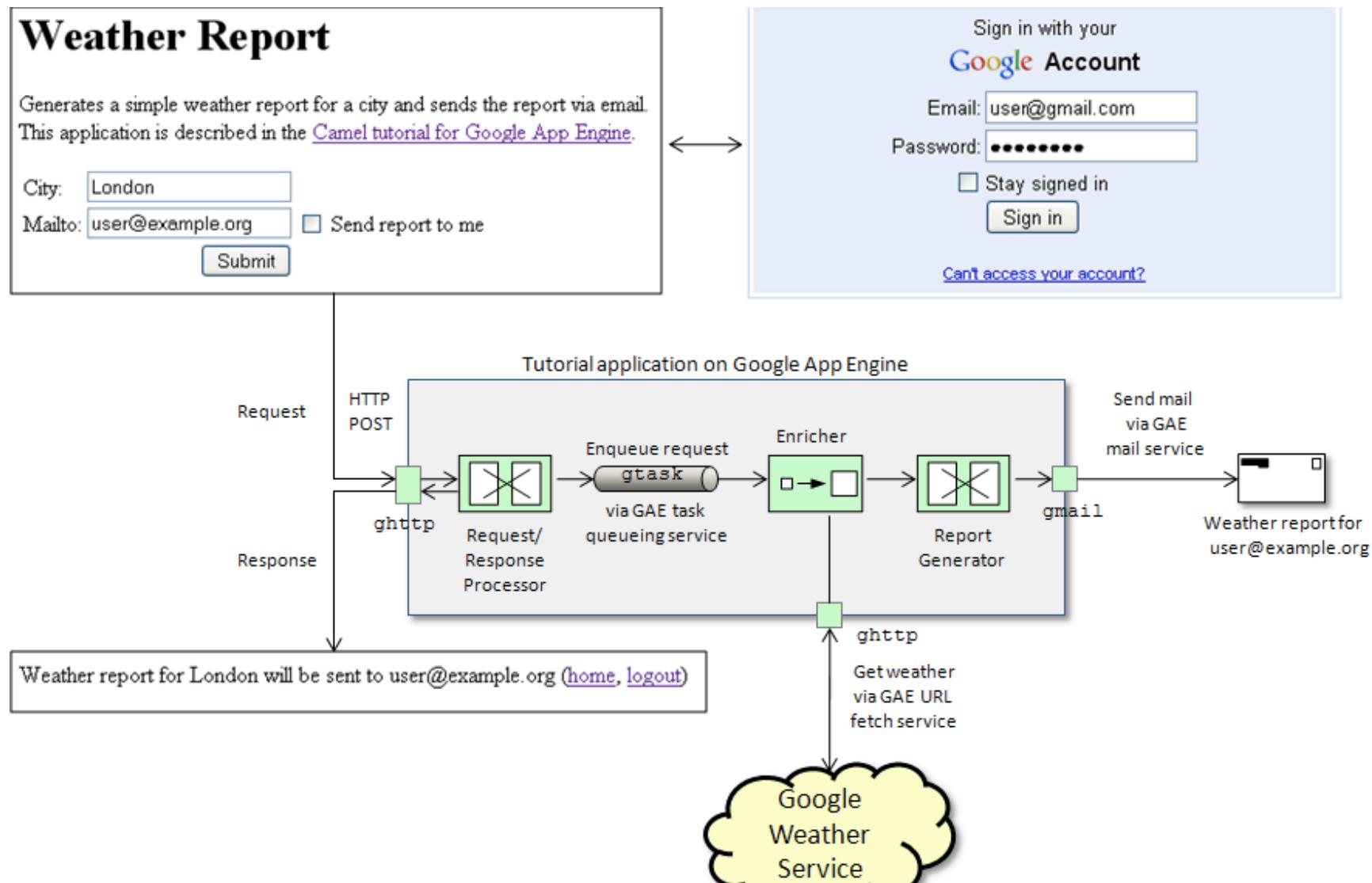
Code Example – Camel GAE Component

```java
@Override
public void configure() throws Exception {
    from("ghttp:///weather")
        .process(new RequestProcessor())
        .marshal().serialization()
        .to("gtask://default")
        .unmarshal().serialization()
        .process(new ResponseProcessor());

    from("gtask://default")
        .unmarshal().serialization()
        .setHeader(Exchange.HTTP_QUERY, constant("weather=").append(ReportData.city()))
        .enrich("ghttp://www.google.com/ig/api", reportDataAggregator())
        .setHeader(GMailBinding.GMAIL_SUBJECT, constant("Weather report"))
        .setHeader(GMailBinding.GMAIL_SENDER, ReportData.requestor())
        .setHeader(GMailBinding.GMAIL_TO, ReportData.recipient())
        .process(new ReportGenerator())
        .to("gmail://default");
}
```

Live Demo

PaaS Integration in Action

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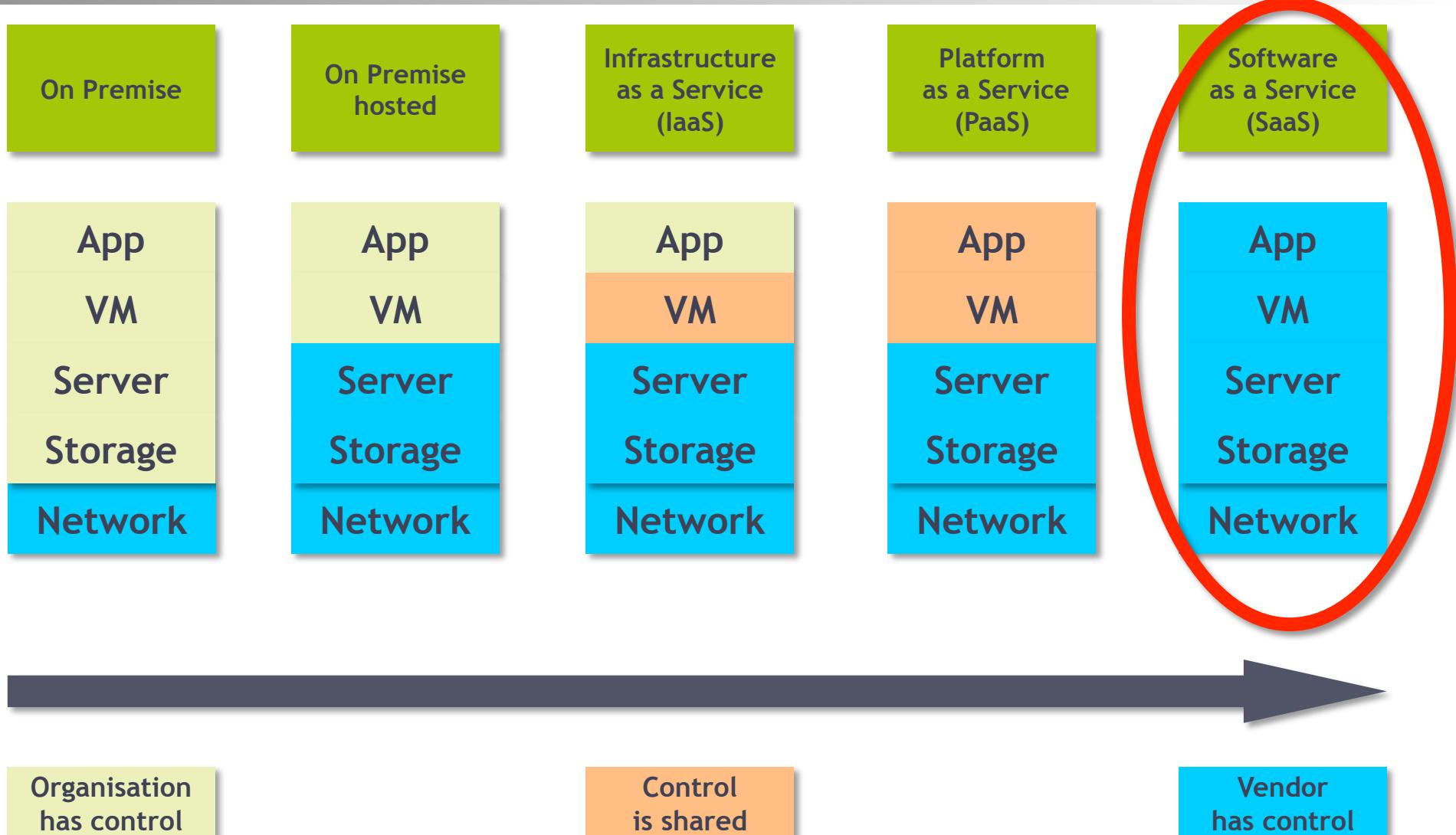
Organisation has control

Control is shared

Vendor has control

Software as a Service (SaaS)

SaaS Concepts (Example: Salesforce)

Software (CRM)
Sales
Service
Social
Data.com
AppExchange
... more ...

Development
Online-Development
(even the Compiler is in the Cloud!)
Own Addons → Force.com (PaaS)
Integration of Interfaces

Apex

Visualforce

REST

SOAP

Client APIs (Java, etc.)

Code Example – Salesforce (Java API)

```
ConnectorConfig config = new ConnectorConfig();
    config.setUsername(userId);
    config.setPassword(passwd);
    config.setAuthEndpoint(authEndPoint);
    connection = new EnterpriseConnection(config);

GetUserInfoResult userInfo = connection.getUserInfo();
System.out.println("User Full Name: " + userInfo.getUserFullName());

        QueryResult qResult = null;

        String soqlQuery = "SELECT FirstName, LastName FROM Contact"; // SOQL

        qResult = connection.query(soqlQuery);
        boolean done = false;
        if (qResult.getSize() > 0) {
          System.out.println("Logged-in user can see " +
              qResult.getRecords().length +
              " contact records."
          );
          while (! done) {
            SObject[] records = qResult.getRecords();
            for ( int i = 0; i < records.length; ++i ) {
              Contact con = (Contact) records[i];
              String fName = con.getFirstName();
              String lName = con.getLastName();
                    // ... more stuff here ...
```

Code Example – Camel Salesforce Component

// Producer

from("direct:toSalesforce")

.to("salesforce://Article__c?user=u&password=p&item=myItem");

// Consumer

from("salesforce://Article__c?user=u&password=p")

.to("mock:fromSalesforce");

Live Demo

SaaS Integration in Action

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Custom Cloud Components

Component

Creates

Endpoint

Creates   Creates

Consumer   Producer
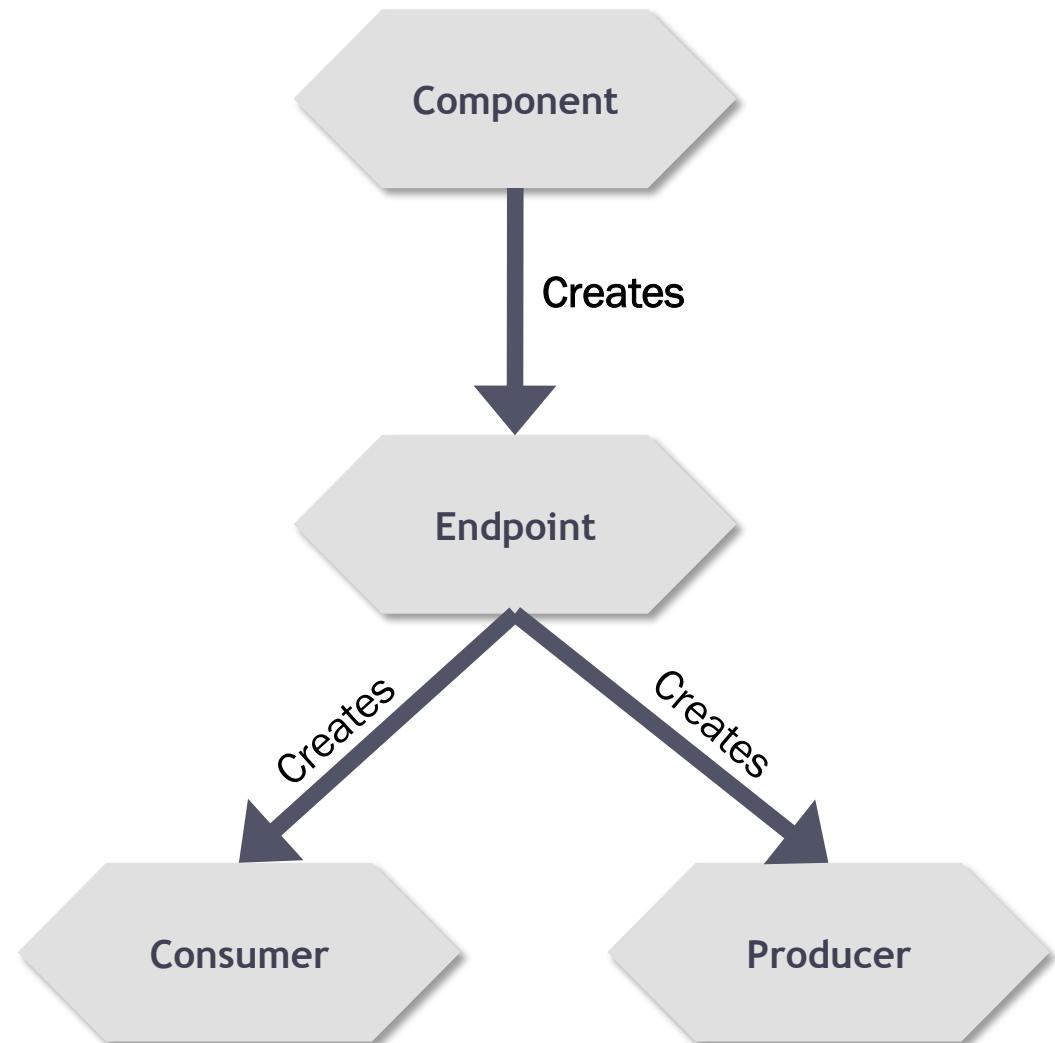
Live Demo
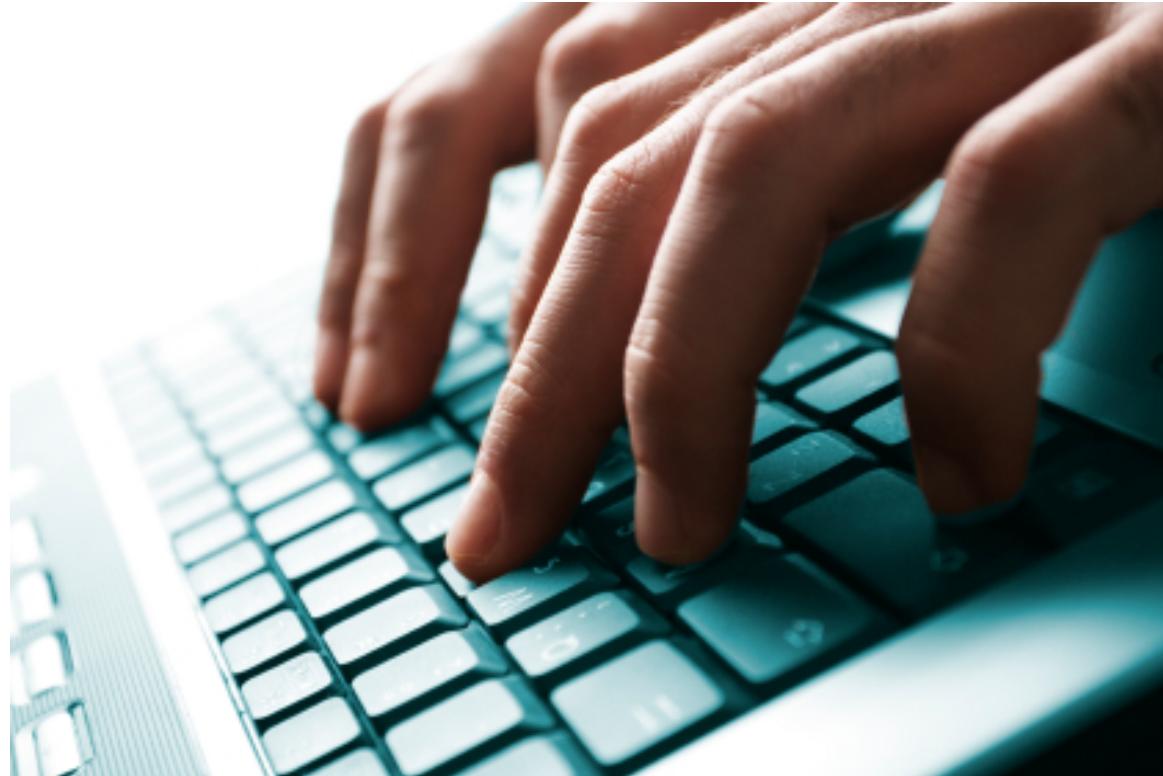
Custom Cloud Component in Action

Alternative for Custom Cloud Components

Sluggish Boy ???

- SOAP
- REST
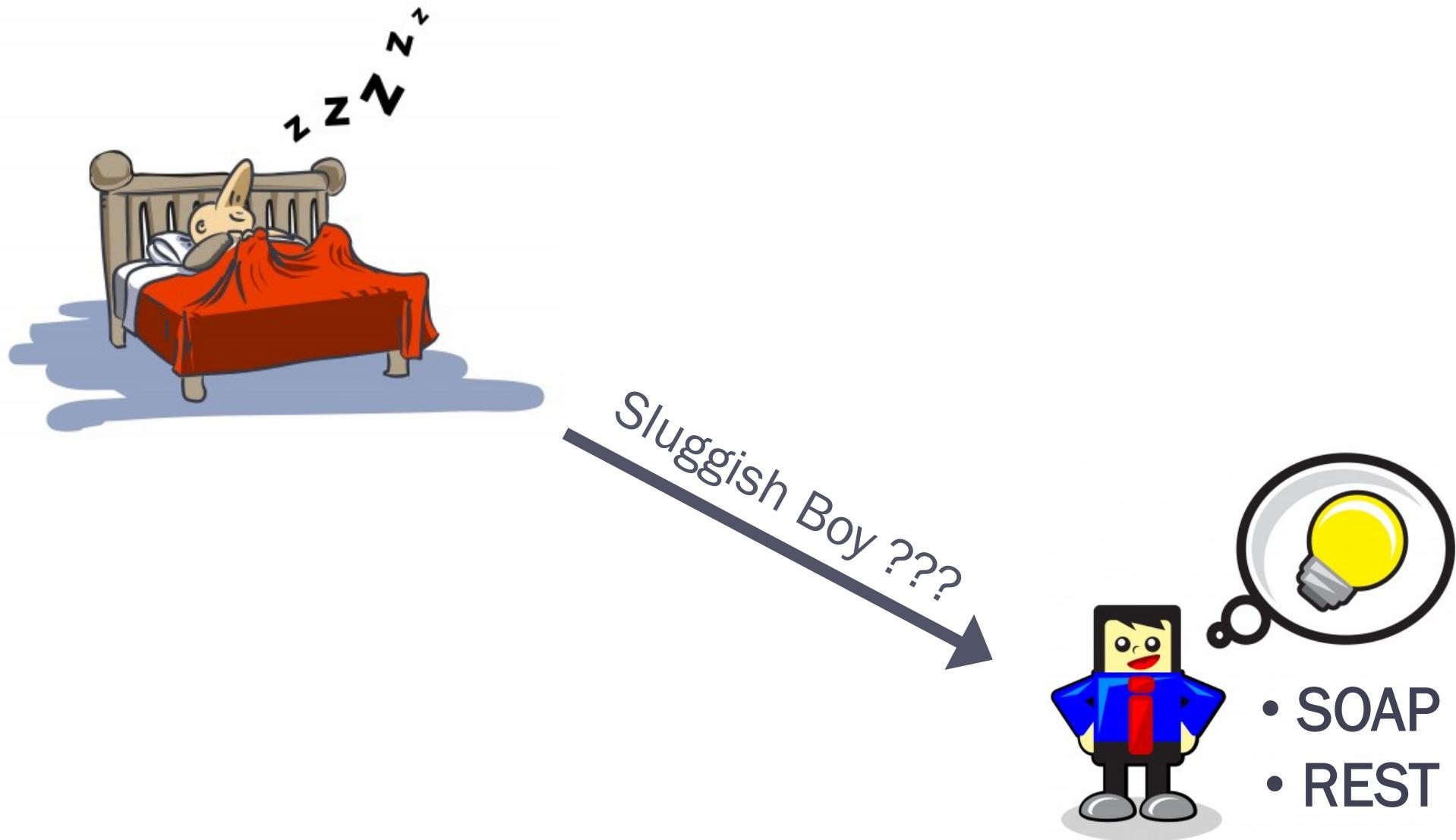
Code Example – Salesforce REST (HTTP)

```
// Salesforce Query (SOQL) via REST API
from("direct:salesforceViaHttpLIST")
        .setHeader("X-PrettyPrint", 1)
        .setHeader("Authorization", accessToken)
        .setHeader(Exchange.CONTENT_TYPE, "application/json")
.to("https://na14.salesforce.com/services/data/v20.0/query?q=SELECT+name+from
        +Article__c")


// Salesforce CREATE via REST API
 from("direct:salesforceViaHttpCREATE")
        .setHeader("X-PrettyPrint", 1)
        .setHeader("Authorization", accessToken)
        .setHeader(Exchange.CONTENT_TYPE, "application/json")
.to("https://na14.salesforce.com/services/data/v20.0/sobjects/Article__c")
```

Live Demo
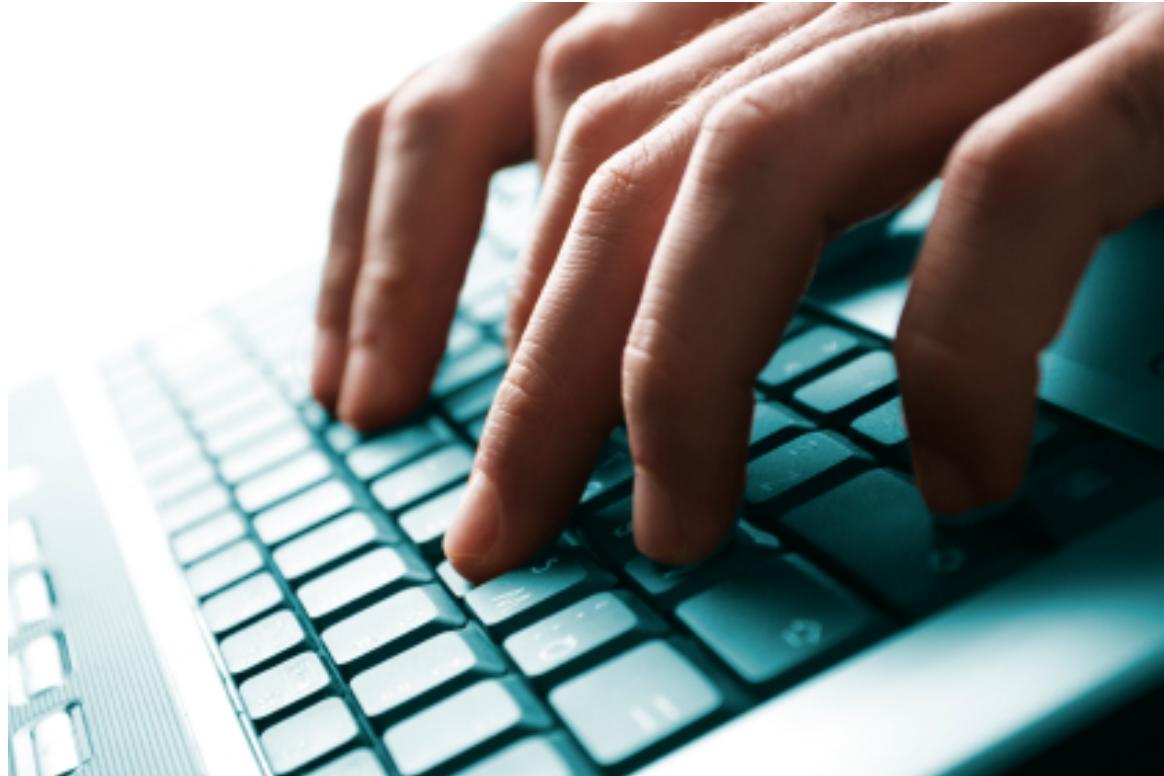
Cloud Integration via REST in Action

# Did you get the Key Message?
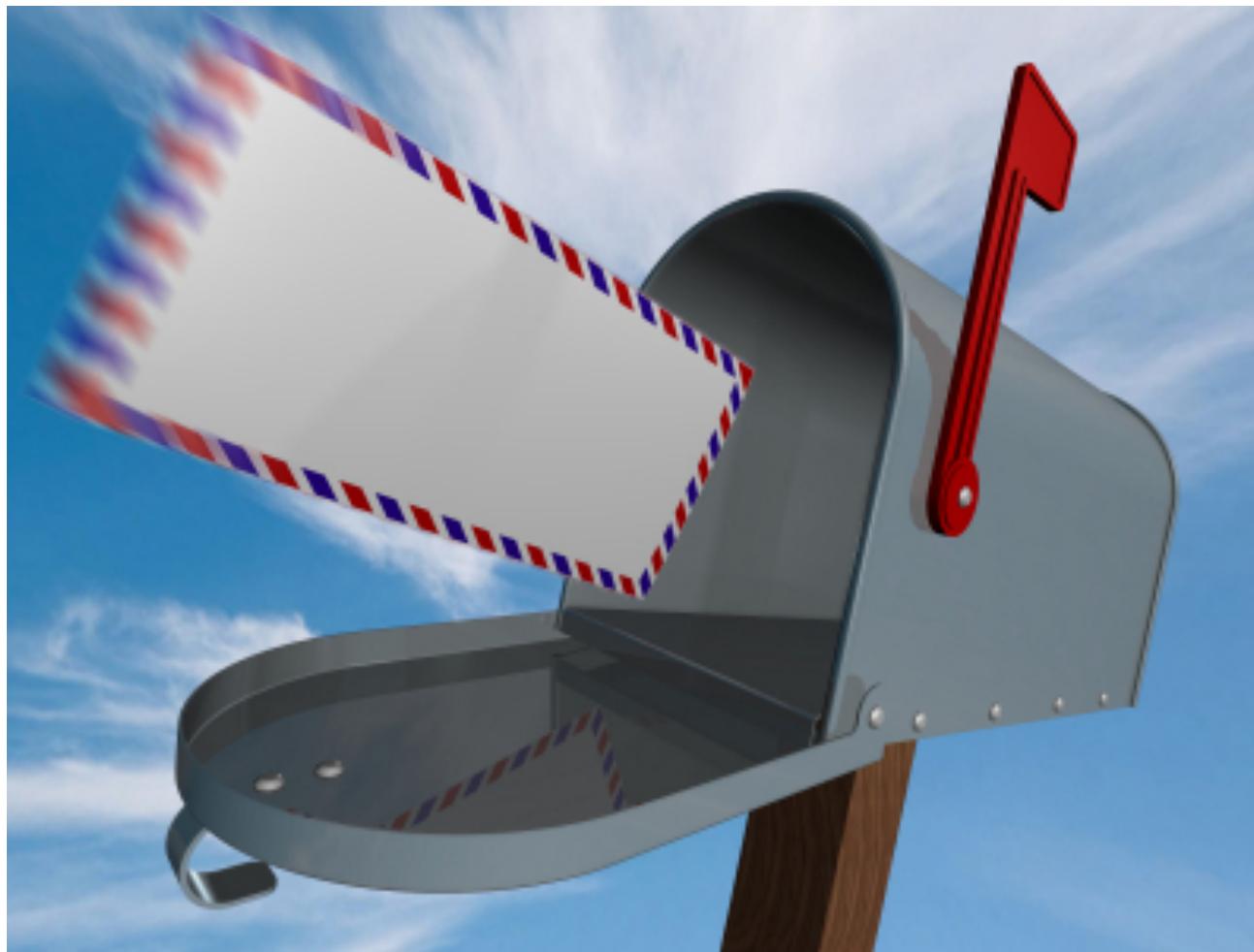
Key Messages

The Cloud already arrived, and must be integrated! ✅

Cloud Integration is already possible! ✅

Apache Camel helps a lot! ✅

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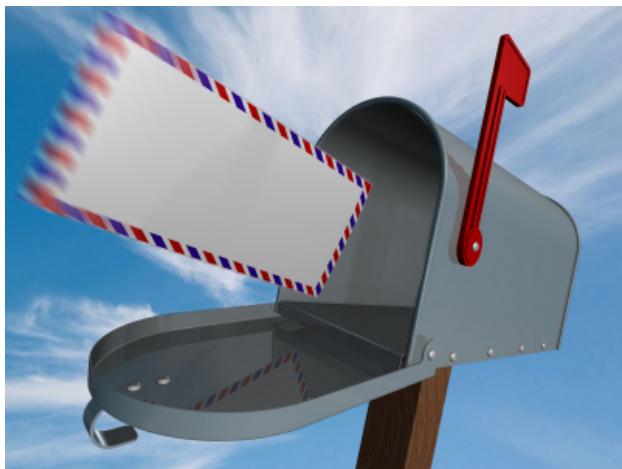
Whet your Appetite?
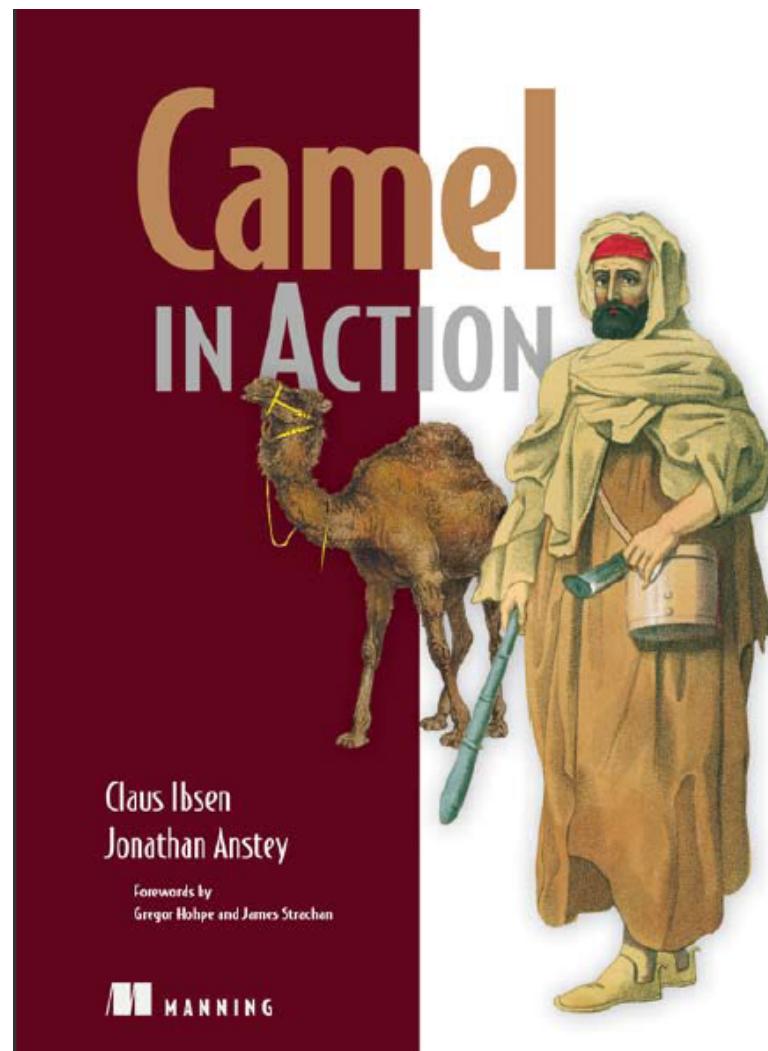
Thank you for your attention. Questions?

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