Ontorion Server with SDK

Cognitum

Ontorion

Semantic Knowledge Management Framework

Distributed Knowledge Management System with **Natural Language** interfaces (CNL) and built-in **rules engine**. It is compatible with **OWL2** and **SWRL** and can be hosted in **Cloud** or **On-Premise** environment. Ontorion is a family of products – server and client-side components for desktop and web allows for broad integration of custom software and existing corporate infrastructure.

Windows Azure

SWRL

OWL2

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Ontorion Key Features

- ✓ **Full OWL2/SWRL support**
  OWL2 and SWRL implementation. XML/OWL or RDF/XML formats can be imported directly.
- ✓ **Description Logic engine**
  OWL-DL (SROIQ) and OWL-EL (EL++) logics are supported.
- ✓ **OWL API compatible**
  Full OWL API (v.3) compatibility.
- ✓ **CNL ready**
  Controlled Language direct support for English, Polish and other languages.
- ✓ **Cloud ready**
  Windows Azure deployment ready with Cassandra clusters. Any cloud IaaS can be supported.
- ✓ **Automated reasoning**
  Built-in reasoning service. Both active and pro-active.
- ✓ **Collaborative Knowledge Editing**
  This powerful feature allows many end-users to edit stored knowledge simultaneously with well-known update/commit scenario (real-time).
- ✓ **Innovative modularization algorithm**
  Instant random access to huge ontologies.
- ✓ **Scalability**
  Huge knowledge bases (ontologies) can be processed and accessed. Simply add more clusters to your deployment.
- ✓ **Safety**
  Redundancy of datasets and spatial cluster decomposition.
- ✓ **Ontology Mapping***
  Built-in ontology mapping mechanism.
- ✓ **Linked Data compatible***
  RDF/SPARQL module can boost SPARQL queries against cashed knowledge.
- ✓ **Solr/Lucene compatible***
  Instant access to all names and linked documents. Build instant search apps with semantic enhancement.
- ✓ **Security and Auditing***
  Restrict access on authorisation basis and audit knowledge change history.

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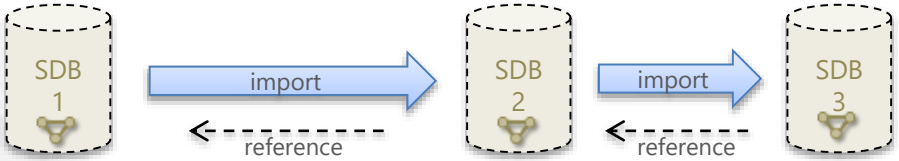
*) these features are available as optional

Ontorion

Challenge and Benefits

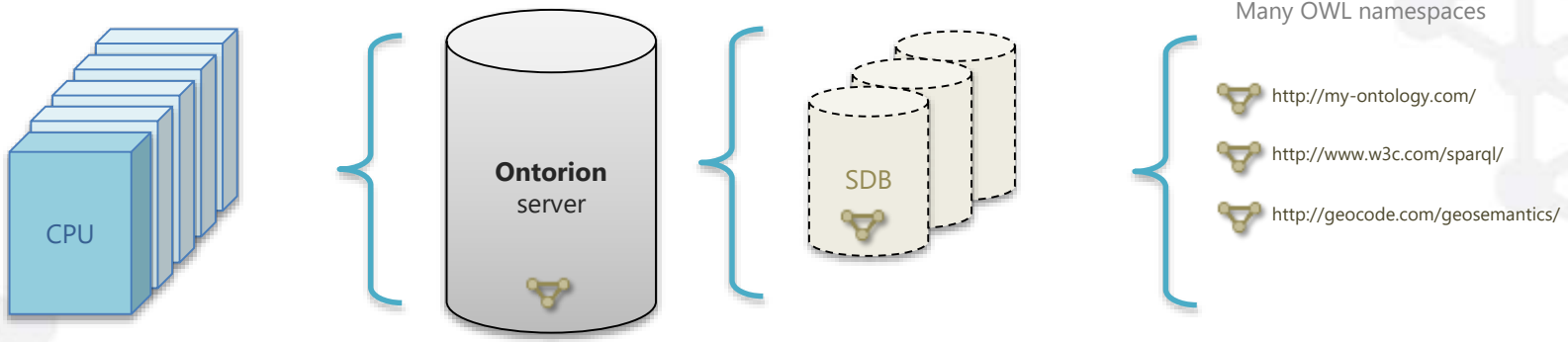
- **Easier and faster searching capabilities**
- **Easier and faster data modeling**
- **High performance**
- **Reliability**
- **Lower data maintenance costs**



Standards (ISO-15926)	Corporate Semantics	Corporate Infrastructure description
"Every **pump** is an element." "Every **valve** is an element." "Every **pipe** is an element."	"Every **my-pump** is a **pump**" "Every **my-valve** is a **valve**" "Every **my-pipe** is a **pipe**"	"**My-Pump-1** is **my-pump** and **is-installed-in Site-A**." "**My-Valve-1 is-connected-to My-Pump-3** and **is-connected-to My-Pipe-1**." "**My-Pipe-1** is a **pipe**."

Physical & logical deployment

Ontorion **server** can be hosted on **one or more physical nodes** (cluster).
Each **server** (cluster) may host **one or more semantic databases**.
Each **semantic database** can manage **one or more OWL namespaces**.

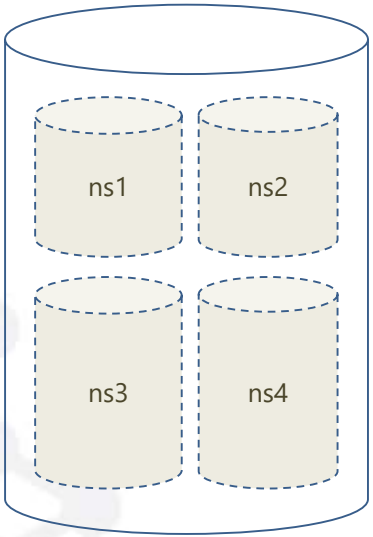


Ontorion server
- Manage Semantic Databases
- Update Semantic Databases
- Access Semantic Databases

Ontorion nodes
- Storage node
- WebAccess node

Semantic Database
- Different R/W access rights for each SDB

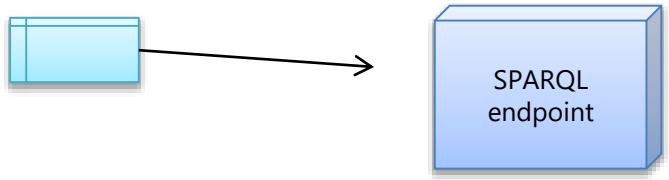
Single node / many databases



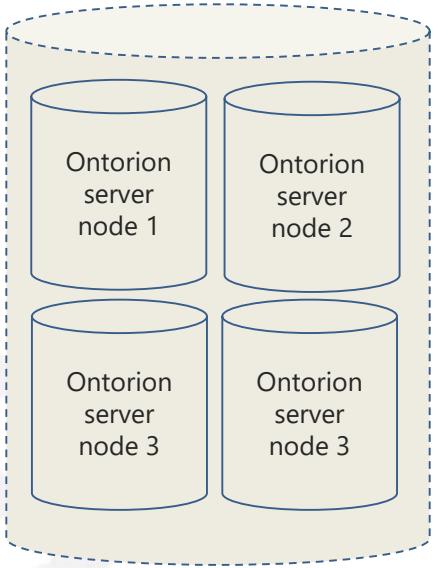
Ontorion server node

http://ontorion1.contoso.com/sparql/ns1/
http://ontorion1.contoso.com/sparql/ns2/
http://ontorion1.contoso.com/sparql/ns3/
http://ontorion1.contoso.com/sparql/ns4/

```
OntorionDriver odriver = new OntorionDriver (“ontorion1.contoso.com”, “ns1”);
odriver.Connect();
```



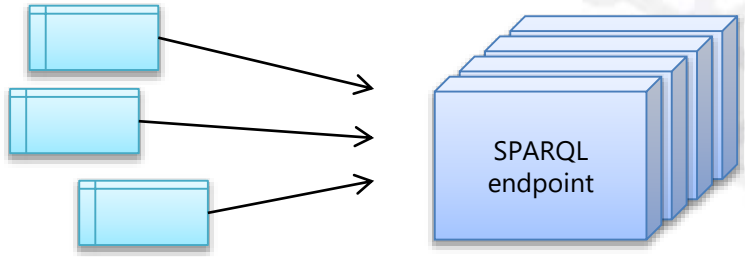
Clustered nodes / single database



database1(ns1)

http://ontorion1.contoso.com/sparql/ns1/
http://ontorion2.contoso.com/sparql/ns1/
http://ontorion3.contoso.com/sparql/ns1
http://ontorion4.contoso.com/sparql/ns1/

```
OntorionDriver odriver = new OntorionDriver (“ontorion1.contoso.com”, “ns1”);
odriver.Connect();
```

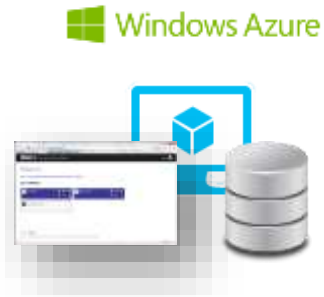


Efficient connection requires load-balanced farm for endpoints

http://webaccess.contoso.com/sparql/ns1/

Flexible, Cloud-ready Architecture

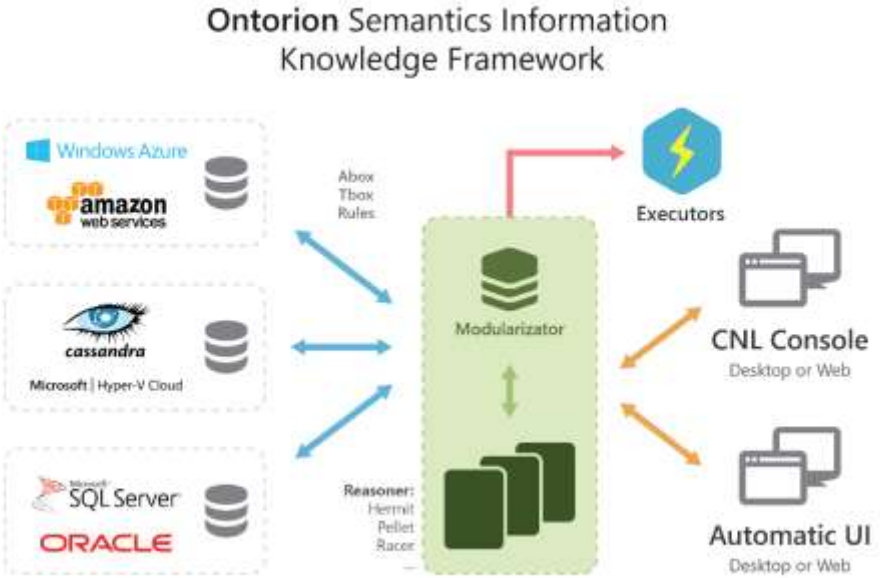
on-premise



cloud: single node

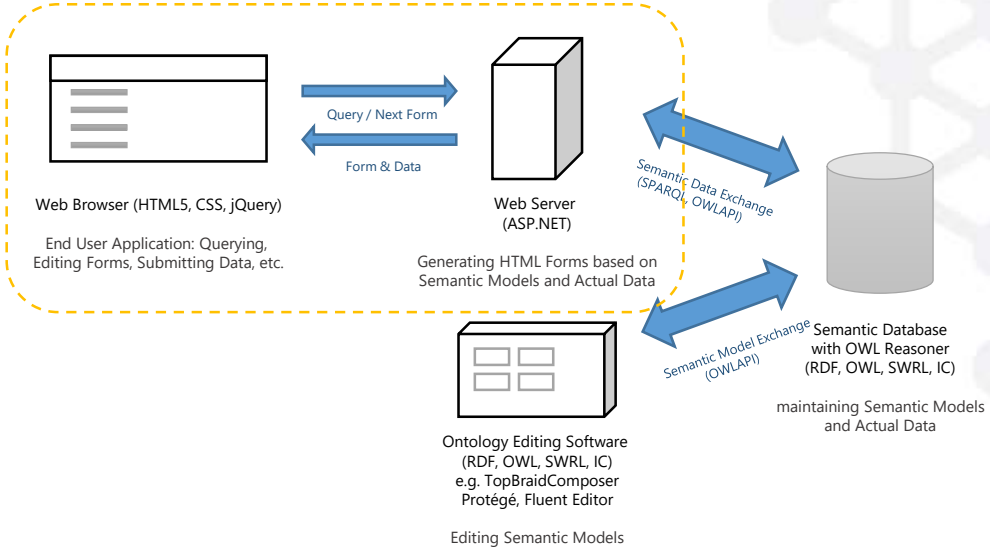
cloud: cluster
(using fast VN)

General Architecture



Ontorion™ Semantic Forms for ASP.NET

A Semantic Model-driven Application Engine with automatic UI generation.



Use Case: Clinical Decision Supporting System

All information are managed in one place, semantically!

- Forms model
- Forms navigation model
- Recommendation rules
- Risk groups rules
- User Context

User Interface for accessing and collecting data is instantly generated automatically.

SWRL rules

Expert Panel:

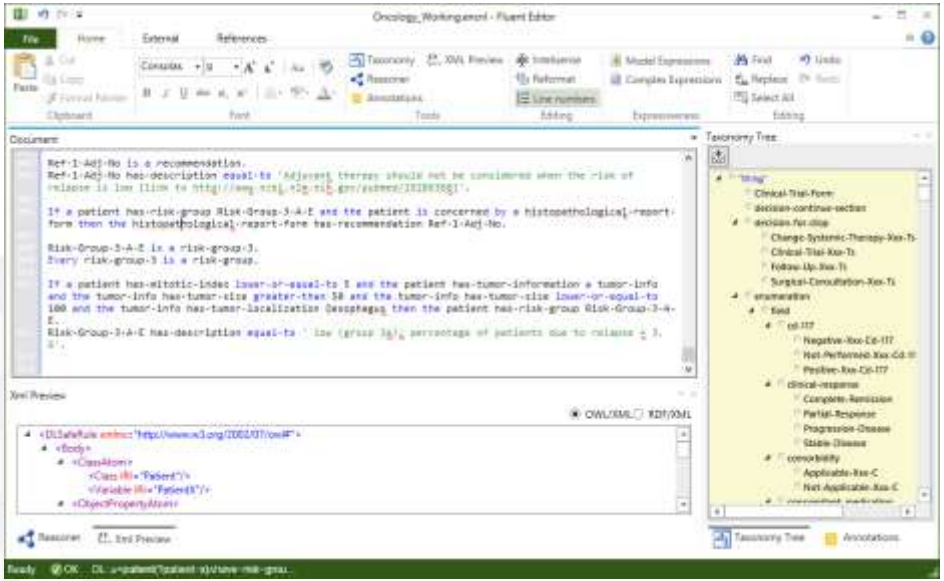
```
Ref-1-Adj-No is a recommendation.
Ref-1-Adj-No has-description equal-to 'Adjuvant therapy should not be considered when the risk of relapse is low [link to http://www.ncbi.nlm.nih.gov/pubmed/19286368]'.

If a patient has-risk-group Risk-Group-3-A-E and the patient is concerned by a histopathological-report-form then the histopathological-report-form has-recommendation Ref-1-Adj-No.
```

XML/SWRL

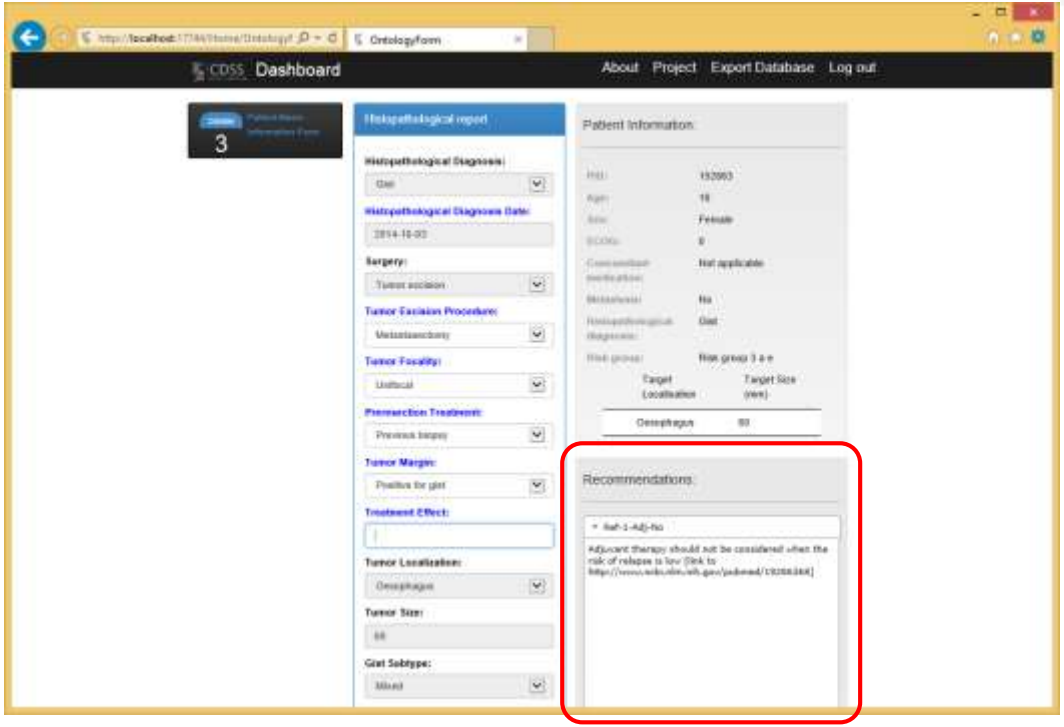
Description Logic:

⌂○patient(?patient−x)∧have−risk−group(?patient−x,Risk−Group−3−A−E)∧○patient(?patient−x)∧○histopathological−report−form(?histopathological−report−form−x)∧concern(?histopathological−report−form−x,?patient−x)→have−recommendation(?histopathological−report−form−x,Ref−1−Adj−No)

Editing OWL & SWRL



Risk groups



Building complex risk rules with SWRL

XML/SWRL

```
If a patient has-mitotic-index lower-or-equal-to 5 and the patient has-tumor-information a
tumor-info and the tumor-info has-tumor-size greater-than 50 and the tumor-info has-tumor-size
lower-or-equal-to 100 and the tumor-info has-tumor-localization Oesophagus then the patient
has-risk-group Risk-Group-3-A-E.
```

Description Logic:

```
⌂○patient(?patient−x)/\°have−mitotic−index(?patient−x,?:value−tmp−1)/\°≤5(?:value−tmp−1)/\○patient(?patient−x)/\○tumor−i
nfo(?tumor−info−x)/\have−tumor−information(?patient−x,?tumor−info−x)/\○tumor−info(?tumor−info−x)/\°have−tumor−size(?t
umor−info−x,?:value−tmp−2)/\°>50(?:value−tmp−2)/\○tumor−info(?tumor−info−x)/\°have−tumor−size(?tumor−info−x,?:value−t
mp−3)/\°≤100(?:value−tmp−3)/\○tumor−info(?tumor−info−x)/\have−tumor−localization(?tumor−info−x,Oesophagus)→have−ris
k−group(?patient−x,Risk−Group−3−A−E)
```



Project Examples

Semantic Project Examples

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Clinical Decision Supporting System for GIST Cancer Treatment

CDSS Powered by Ontorion

CENTRUM ONKOLOGII – INSTYTUT IM. MARII SKŁODOWSKIEJ-CURIE

ESMO GOOD SCIENCE BETTER MEDICINE BEST PRACTICE

European Society for Medical Oncology

- Ontorion™ Fluent Editor™ 2014
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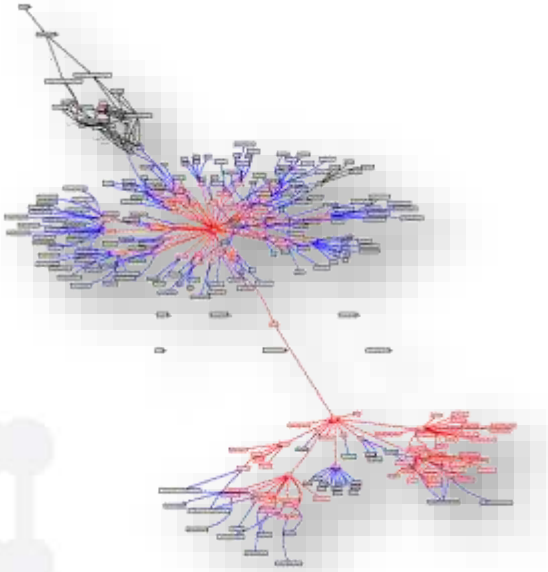
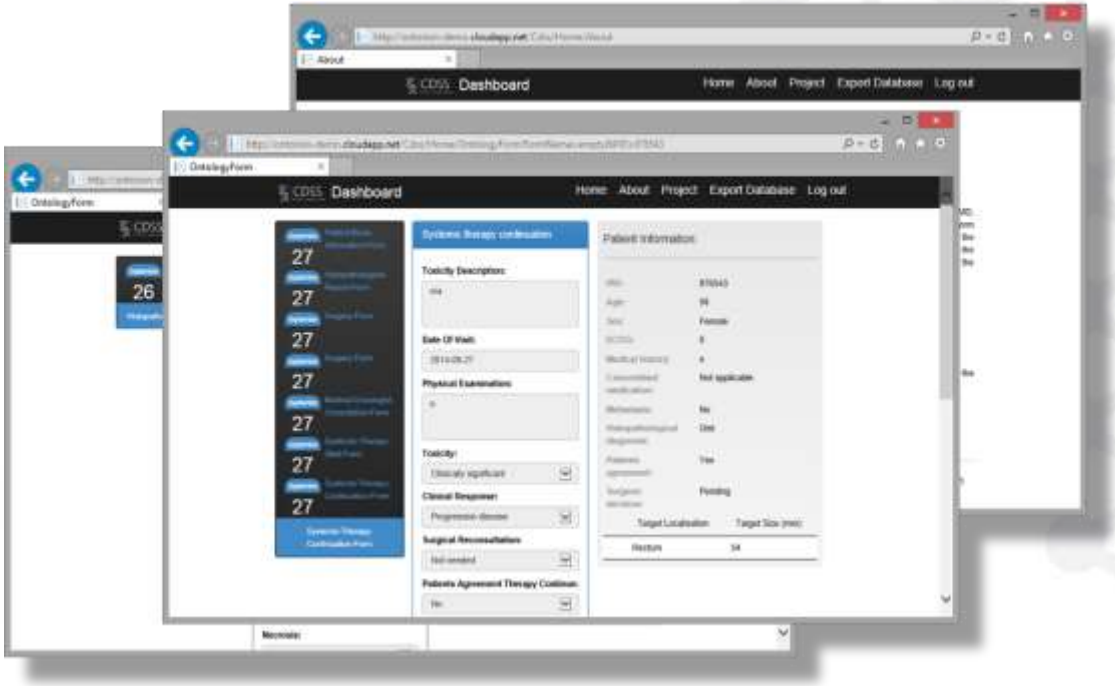
Managing system complexity





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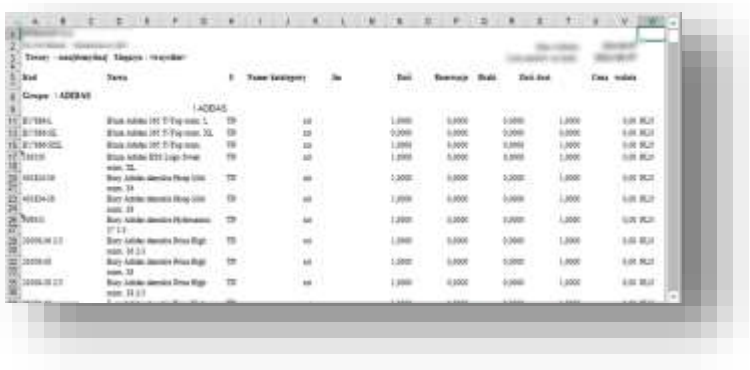
Intelligent Stockhouse Management

Powered by Ontorion



AUDYTEL

- Ontorion™ Fluent Editor™ 2014
- Ontorion™ Server with SDK
- Ontorion™ Text Mining Tools

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Semantic Data (OWL/SWRL)
Instance Data (RDF)
Structured Data (BigTable)

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Intelligent Stockhouse Applications

Module 1

Module 2

Module 3

ETL process

OBDA

Unstructured data

Unmanaged data

Sales data

Stock data

CRM data

Purchase data

Existing ERP application

Existing at Customer site

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Windows Azure Circle Partner

Windows Azure

Thank you!

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