flexibility comes first

A Self-service Platform for
Linked Data Application Development
Linked Data: Next-generation Data Management

The term Linked Data refers to data represented in a unifying, machine-readable data format that makes it possible to semantically interlink and connect heterogeneous resources at data level – no matter what the structure of the data is, who created it, or where it comes from! Exhibiting a high degree of interoperability and ease of reuse, Linked Data formats have become a prominent choice for publishing data on the web as Linked Open Data, and the principles are becoming increasingly popular in the enterprise world, with internal data being represented as Linked Enterprise Data.

“We are convinced that Linked Data, in particular the combination of Linked Enterprise Data with Linked Open Data, offers great potential for building innovative applications that integrate heterogeneous data from different sources in order to overcome the limitations of traditional data management systems.”

The Information Workbench™
A Self-service Platform for Linked Data Application Development

Pursuing the goal to lower the entry barrier into the world of Linked Data and to leverage its benefits, we are developing the Information Workbench™ as a free, Open Source platform for Linked Data application development. Designed as a self-service platform, it provides you with all the tools and features you need to quickly build your personal Linked Data applications!

Our Solution

... get ready for Linked Data!

- Registry-based Linked Open Data discovery and flexible integration of legacy data sources
- Semantic data storage, including out-of-the-box support for advanced search and efficient information access
- Extensible context-aware, widget-based UI supporting target-oriented data exploration, mashup, and self-service analytics
- Support for collaborative knowledge acquisition and augmentation, e.g. by use of Semantic Wiki technology
- Different APIs and SDKs to use, modify, personalize, and extend existing features
- Open source, freely and publicly available
- Compatible with major RDF data stores like Sesame and OWLIM
- Cloud-ready, available as EC2 appliance

Your Opportunities

... for Innovative Enterprises

- Semantically integrate and interlink data scattered among different systems, to provide a unified view on isolated data silos
- Cross the chasm between enterprise-internal and public data, thus making public knowledge available internally
- Leverage semantic technologies for improved search, presentation, and collaborative augmentation of data

... for the Semantic Web Community

- Explore global Linked Open Data registries and integrate relevant data sets on demand
- Rapidly build novel Linked Open Data applications using W3C standards like RDF and SPARQL
- Develop cutting-edge semantic technologies on top of existing core infrastructure
Key Features of the Information Workbench™

Self-service Discovery and Integration of Data Sources

With its focus on Linked Data application development, the Information Workbench™ provides flexible and extensible interfaces for integrating and connecting data from different sources. Global Linked Open Data registries like CKAN, the comprehensive knowledge archive network, are supported out-of-the-box, making it possible to discover, visually explore, and integrate available Linked Open Data sets on mouse-click. In addition, data from other sources such as internal Relational Databases or CSV files can easily be integrated in a pay-as-you-go fashion: the more effort invested into integration, the better the degree of linking and the quality of the integrated data.

Ad-hoc Exploration, Mashup, and Self-service Analytics

All integrated data is accessible through an extensible, AJAX-based Web frontend, which follows the vision of a Living UI that configures itself to automatically display the information most relevant to the user. Different exploration paradigms, such as resource-specific Wiki pages, a data graph, or visual exploration support, play together and cover different use cases as well as user preferences.

The frontend supports mashups on both data and widget level, making it possible to interlink data from multiple sources using different visualization and exploration widgets, e.g. geo-mappings to display locations mentioned in the data, heatmaps, twitter live feeds, or data visualization and exploration with the PivotViewer. The resulting, context-sensitive interface is automatically built from an extensible pool of predefined widgets, which are dynamically selected based on the semantics of the data to be visualized.

In addition, the Information Workbench™ comes with advanced features for reporting and analytics: following the self-service paradigm, users can create mashed-up, personalized dashboards comprising dynamically generated query results, bar and pie chart visualizations, time series diagrams, stock charts, and many more.

Collaborative Knowledge Acquisition and Augmentation

As another central feature, users can collaboratively acquire new and complement existing knowledge, e.g. by editing Semantic Wiki pages related to the resources in the repository. Using Semantic MediaWiki syntax, one can easily annotate resources with semantically meaningful information, establish relationships between them, or simply add free-text documentation. In addition, ontology-driven edit forms support the target-oriented knowledge acquisition process. Within this process, the system permanently tracks data provenance and user changes.
Data Integration through Data Providers

Information integration in the Information Workbench™ relies on the concept of so-called data providers. A data provider is a module that gathers information from an internal or external information source, converts it into the RDF data format, and appends the converted data to the virtual repository. A variety of predefined provider types support the fast integration of legacy data sources like

- relational database or other tabular data such as CSV files,
- Web data accessible through the SOAP or REST protocol,
- internal systems such as LDAP or ERP, and many more.

The data providers are customizable and extensible, ultimately allowing users to integrate data from every accessible data source. Accounting for the dynamics of existing data sets, the provider concept also offers built-in mechanisms to synchronize information sources periodically.

Complementary to the providers, Linked Open Data registries are used for automatic data discovery. The integration of such registries allows the user to visually explore and integrate available data with little effort.

Advanced Search and Efficient Information Access

Conceptually, every resource in the Information Workbench™ repository may have associated structured data in the form of RDF triples and unstructured data in the form of its Wiki page, both of which are treated as first-class citizens. Accounting for the coexistence of structured and unstructured data, the system implements advanced search paradigms, like

- the combination of simple keyword-based and more complex graph pattern-based search, allowing an integrated search in both the structured and unstructured repository content,
- faceted search, making it possible to refine search results along several dimensions, and
- semantic query completion, which assists the user in iteratively building sophisticated structured queries starting from a simple keyword query.

Extensible, Widget-based User Interface

The living UI built on top of the Information Workbench™ is realized via semantic-aware widgets. The automated widget selection process is data-driven and follows a resource-centric paradigm: whenever the system is issued to display information related to a certain resource, the data associated to this resource is matched against the requirements of existing widget types and the system selects those widgets for visualization that fit the data under consideration. There exists a large collection of predefined widgets with varying functional focus, such as

- visualization widgets like charts and diagrams that can be used to display query results,
- navigation widgets, like a browsable graph of the underlying RDF data,
- collaboration widgets, like Wiki edit pages or editable property-value lists, or
- social networking widgets, e.g. to integrate associated Twitter or Facebook live feeds.

Accounting for the self-service application development paradigm, developers can extend the predefined set of widgets by writing their own code using standard technologies like GWT.
Build Your Linked Data Application. Within Minutes.

1. **Linked Open Data Discovery**
   - Visually explore data sets registered to global data registries
   - Sort and filter data sets by domain, location, creator, creation time, and many more facets to identify data you’re interested in

2. **Data Integration**
   - Integrate discovered Linked Data repositories with a single click
   - Add providers for internal and external legacy data sources
   - Improve data quality via incremental refinement of the ontology

3. **Customization**
   - Dedratively specify UI based on available pool of widgets
   - Embed reports and charts into wiki pages and wiki page templates
   - Semantically annotate and interlink connected resources

4. **Advanced System Configuration and Extensions**
   - Use APIs and SDKs to implement your own widgets and mash-ups
   - Script your own providers to integrate data hidden behind non-standard interfaces
   - Develop and integrate your own modules, e.g. for customized search and information extraction
Your Way to the Information Workbench™

You want more information or are interested in a live-demo?

Demonstrator at http://iwb.fluidops.com

On our project page, you can also find additional resources like screencams and related scientific publications..

You are interested in using the Information Workbench™ out-of-the-box?

Download Installer or Virtual Appliance at http://iwb.fluidops.com/download

On our download page, you can either

- download the binary, which you can directly install on your local PC, or
- get information on how to run the Information Workbench™ as virtual appliance, in the form of a ready-to-use image for EC2 cloud infrastructure!

You are considering building advanced applications with the Information Workbench™?

Open Source Project at http://iwb.fluidops.com/community

The Information Workbench™ core platform is freely available. You are allowed to use, modify, and redistribute it under the terms of the GNU Lesser Public License (LGPL).

Designed with self-service application development and extensibility in mind, it comes with

- support for fast and flexible, registry-based integration of Linked Open Data,
- an extensible provider concept, allowing you to integrate other types of data sources,
- a flexible, widget-based user interface, which is highly configurable and easily extensible,
- different APIs and SDKs, to use, customize, and extend existing features, and
- support for Google Web Toolkit (GWT), allowing to code widgets in a standardized way.

Start developing your own Linked Data applications with the Information Workbench™ now!

References

eCloudManager Intelligence Edition

The Information Workbench™ is productively used at the core of fluid Operations’ eCloudManager™ Intelligence Edition, a commercial data center intelligence platform.

Supported Technology

Research Partners and Projects
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