



WHITE PAPER

Intelligence2day® Technical Architecture



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1 INTRODUCTION

This White Paper provides a technical overview and some insights into the technologies that Intelligence2day® relies on. The purpose is to help IT managers, CIO's and Intelligence2day® system administrators to understand the technical architecture of Comintelli Intelligence2day®. This White Paper does not describe applications and user functions, since this is covered in other Comintelli documentations.

Technical Standards and technologies

Intelligence2day® is based on open protocol standards and data formats like JSON and XML. The application interface can be accessed through the HTTPS protocol and is based on open frameworks such as jQuery and Twitter Bootstrap. Users only need a modern web browser like Edge or Chrome. End-of-Life browsers are not supported.

Intelligence2day® is easy to integrate with other systems and supports major internet protocols, and component models, including JSON, RSS, RESTful Web services and Secure IMAP. The application is based on Unicode UTF8 characters, which covers most languages.

Intelligence2day® scales horizontally to thousands of concurrent users and millions of documents. How many users and articles that the system may have is limited by the license agreement.

The system implements High Availability technologies like clustering with failover and a Load Management System, which is a method where simultaneous user requests are distributed and balanced among multiple nodes.

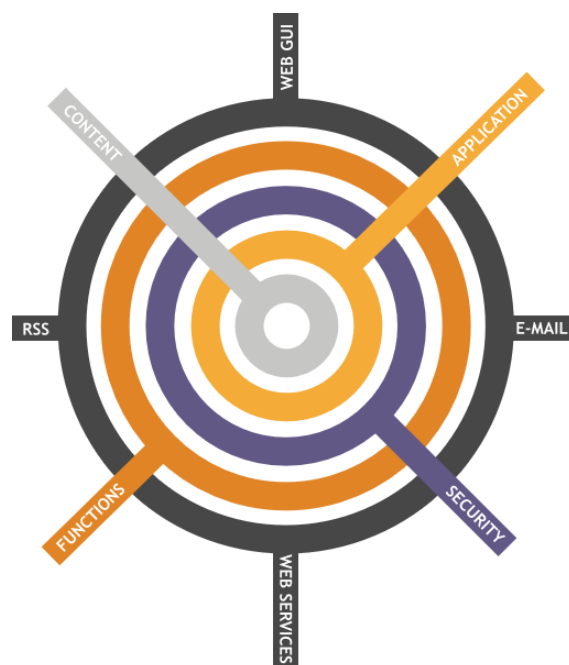
The intelligence2day® backend is based on the Linux operating system and Kubernetes container-orchestration system. Data storage technologies includes MYSQL, NoSQL such as Apache Solr, Apache Cassandra and Firestore.

AI Technologies include Natural Language Processing, Neural Networks and Deep Learning Models, Clustering Algorithms and Advanced Image Recognition. Some AI features requires Intelligence2day® to send content to 3rd party providers. The data is handled privately and is processed exclusively for Intelligence2day®.

2 The Five Layers of Intelligence2day®

The architecture of Comintelli® Intelligence2day® consists of five layers.

1. **Content:** at the core of Intelligence2day® is content storage.
2. **Application Layer:** contains site functions (based on java).
3. **Security Layer:** controls access to Intelligence2day®.
4. **Functional Modules:** contains user functionality.
5. **User Interface:** the final layer is what meets the end-user of Intelligence2day®, who can access content via web interface, web services, RSS and/or e-mail.



Each layer will be described in more detail below.

2.1 Content Layer

Content retrieval and storage is at the core of Intelligence2day®. The application is content-neutral, meaning that the customer is in full control over what content goes into the system. By default, a Business Industry Feed is included. As an add on, custom feeds and crawlers are available. Additional content can be retrieved both from internal sources or external sources (such as e-mail, JSON and RSS feeds). Intelligence2day® supports most file formats, including PDF and MS and Open Office. For security reasons, executable files are not allowed.

2.1.1 Content Retrieval

The Content Retriever module in Intelligence2day® enables automatic, scheduled retrieval of news, analysis reports and information from a wide range of sources, external as well as internal, including:

1. E-mail Feeds (all e-mails sent to a specific e-mail box are converted into Intelligence2day® articles).
2. Web News, RSS Feeds and Content Connectors

3. Custom connectors (Markup text formats such as CSV, XML or others)

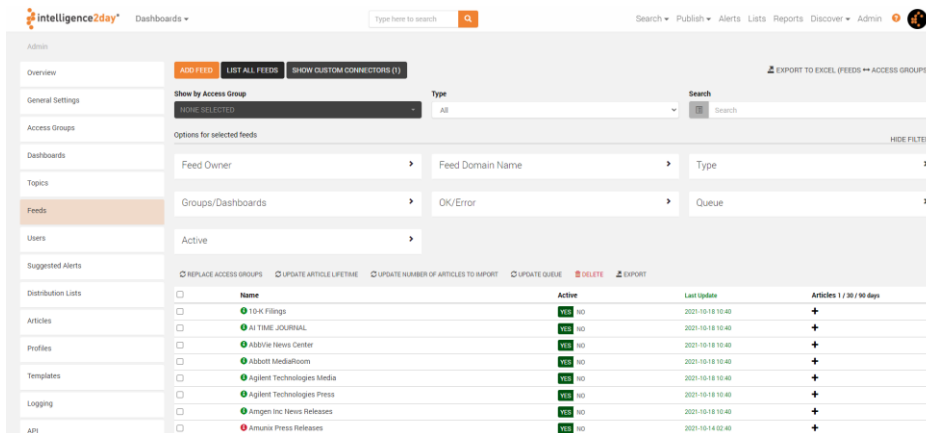


Image: Managing External Content Feeds in Intelligence2day®

The Content Management module of Intelligence2day® can of course also be used to manually enter information directly into the system (see below).

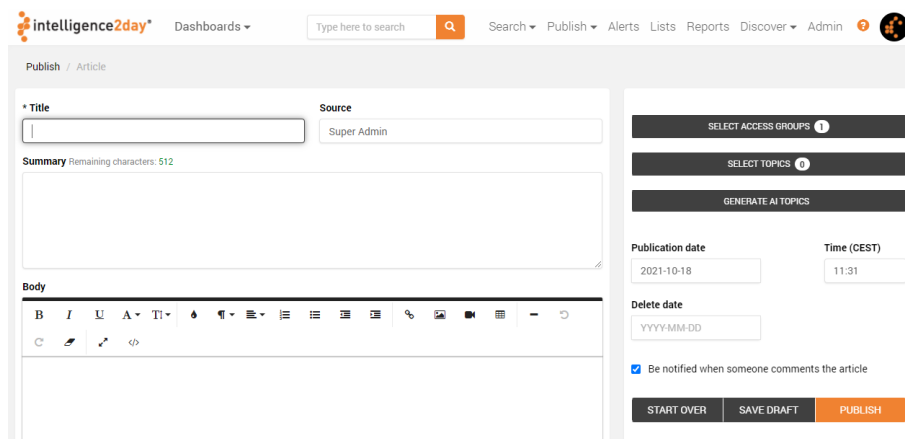


Image: Manually publishing Content in Intelligence2day®

More information about Content Management and Content Retriever can be found in the Intelligence2day® Functionality Description.

2.1.2 Content storage

All Data is encrypted both at rest and in transit.

All content is normalized to Articles and stored in the Solr Search index. Manually published content and document history is stored redundantly on a Storage Area Network. The SQL Server database is mainly used to define the relations between the information objects in a security context. NoSQL stores large quantity information such as topics, meta- and statistical data. To provide additional functionality, scalability and speed, the Search Engine is used as a content cache to the Application Layer.

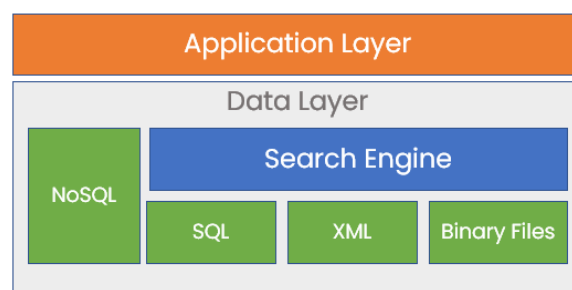


IMAGE: Content Storage in Intelligence2day®

The Internal or edited Articles text and Metadata is automatically exported to XML files on disk. The primary purpose of XML is to help information systems share structured data. XML is the native storage format, recommended by the World Wide Web Consortium (W3C). It is a free open standard and guarantees that the information stored in Intelligence2day® is reusable and possible to export to other systems.

Most of the information stored in the databases about an article is also replicated in XML file format for backup purposes.

Intelligence2day® also supports full or partial data export in JSON format, using the API.

Articles in Intelligence2day® can also contain binary attachments, e.g., PDF files, MS Office documents and images. These are stored on the hard disk in their native formats but are indexed and searchable.

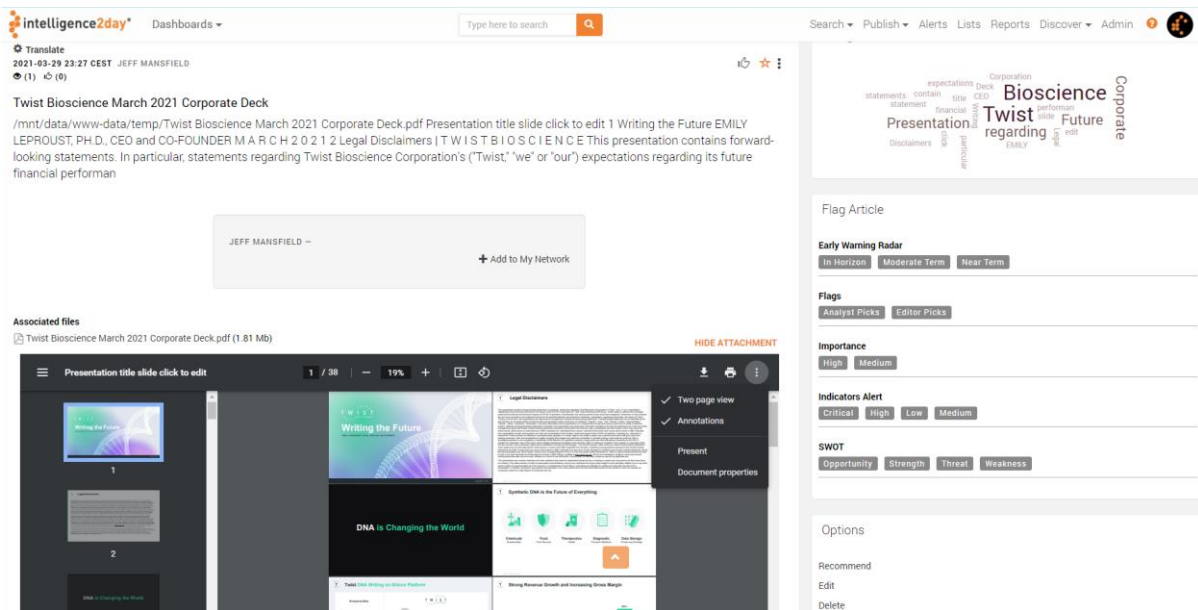


Image: An article with an attached PDF file

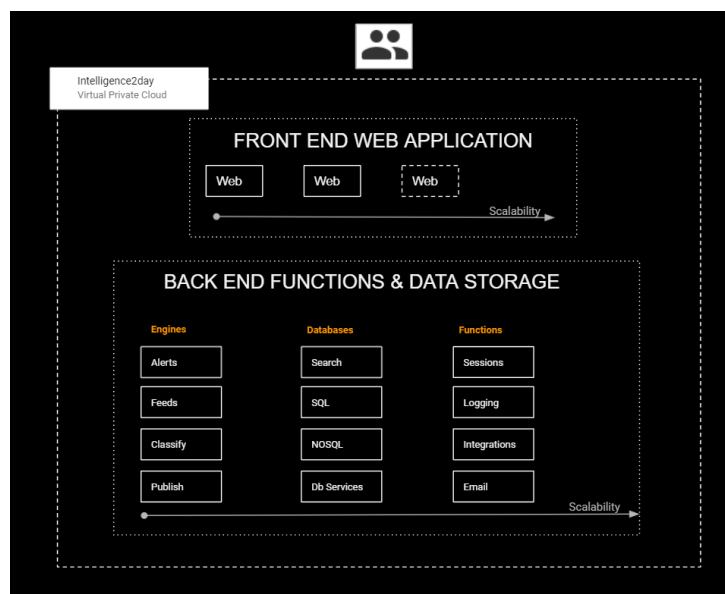
For Performance reasons, when a user reads an article, all information displayed is retrieved from the Search Engine which eliminates the need to get information from the databases and XML file.

Content stored in Intelligence2day is backed up on a daily basis..

3 Systems Architecture overview

Intelligence2day is built with scalability in mind and is capable of automatic horizontal scaling, adding more nodes as required.

It is a front-end, back-end architecture where the Application servers serves end users with functionality and the back end is built as Pods with dedicated functionality tasks. With rare exceptions, communication within back-end and to the front-end is encrypted. Some data like statistics are not encrypted in transit for protocol and overhead reasons. These data are not considered sensitive but there is an ongoing project for moving the data to a fully encrypted platform.



2.2 Application Layer

The Application Layer is the part of the system that provides end user functionality and handles back-end data and presentation of information to the users.

Application Layer

- Load Balancer / Firewall
- Web Server
- Intelligence2day®
- Application Server / Java JVM
- Search Engine
- Databases
- Linux Server
- Hardware

Image: Application layer of intelligence2day®

It comprises system-wide functionality for Security, Administration, Statistics, Analysis, Fees Management, and data Classification (including setup of topics).

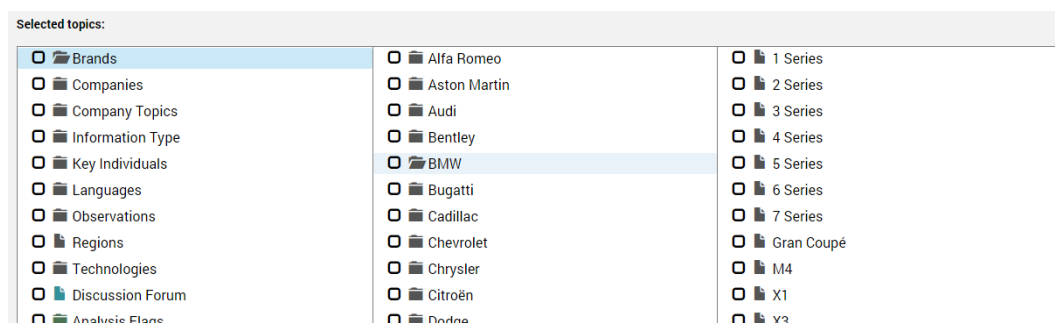


Image: Example of Topics

The layout of the system is based on Twitter Bootstrap Themes. It is separated from the functionality layer; Administrators may select appearance from a wide set of coloured themes. More details can be found in the Intelligence2day® Functionality Description.

2.2.1 Application Server

Intelligence2day® front-end runs on Nginx Web Servers and an open source J2EE Application Server, Lucee that implements a lightweight dynamically typed scripting language for the Java virtual machine (JVM), facilitating the rapid development of web applications that compile directly to Java bytecode.

Development of Lucee is supported by the "Lucee Association Switzerland" established as an Association under the Swiss civil code. The goal of the Lucee Association Switzerland is to promote, support, and advance its open-source project.

Back-end modules such as Feed Server are developed with the Python programming language and deployed as Pods in the Kubernetes cluster.

2.3 Security Layer

Security is one of the very highest priorities of Intelligence2day®. More than twenty years of experience with competitive intelligence applications has led to a deep understanding of how to manage security to minimize threats and unauthorized access. Intelligence2day® has been tested and certified in production by some of the world's most demanding organizations.

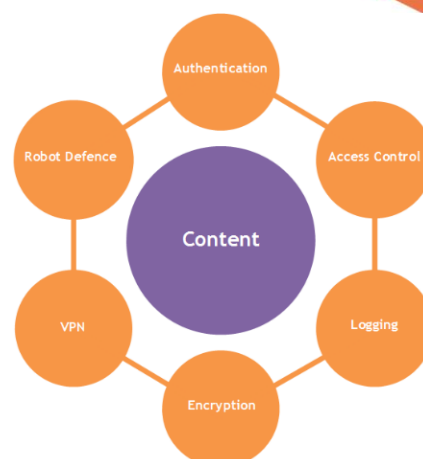
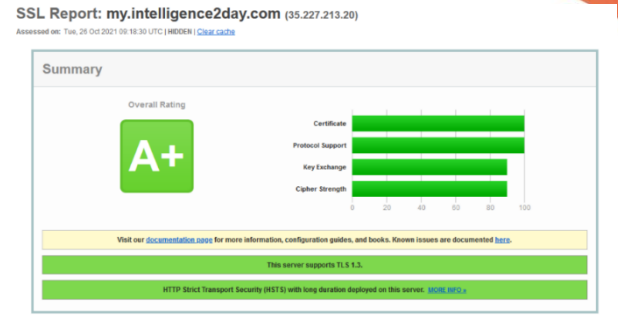


Image: Security layer of Intelligence2day®

The Security Layer of Intelligence2day® contains:

1. Authentication mechanism for granting users access to the information. Based on SAML (SSO) or form-based login.
2. Groups and Access Control – provides access to content in Intelligence2day® to eligible users.
3. User Profile based access to functionality.
4. Additional functionality for stopping automated attempts to gain unauthorized access to content. After a few failed attempts the target account is locked in an hour and the user is notified by email.
5. Logging of events:
Data modifications and administrative actions, successful and failed logins are logged and traceable.
6. Data Encryption.
Both data at rest and in transit are encrypted. This means that data transferred from intelligence2day® all the way to the users' browsers using TLS 1.3 protocol with 256-bit AES encryption.

- 7. Traffic between the Server and Client is encrypted using SSL and Intelligence2day® achieves Qualys A+ Encryption Rating



- **User Rights and Roles**

A User within the system can be assigned different levels of rights with role templates. Depending on the User's assigned role and Access group, different sets of rights are applied.

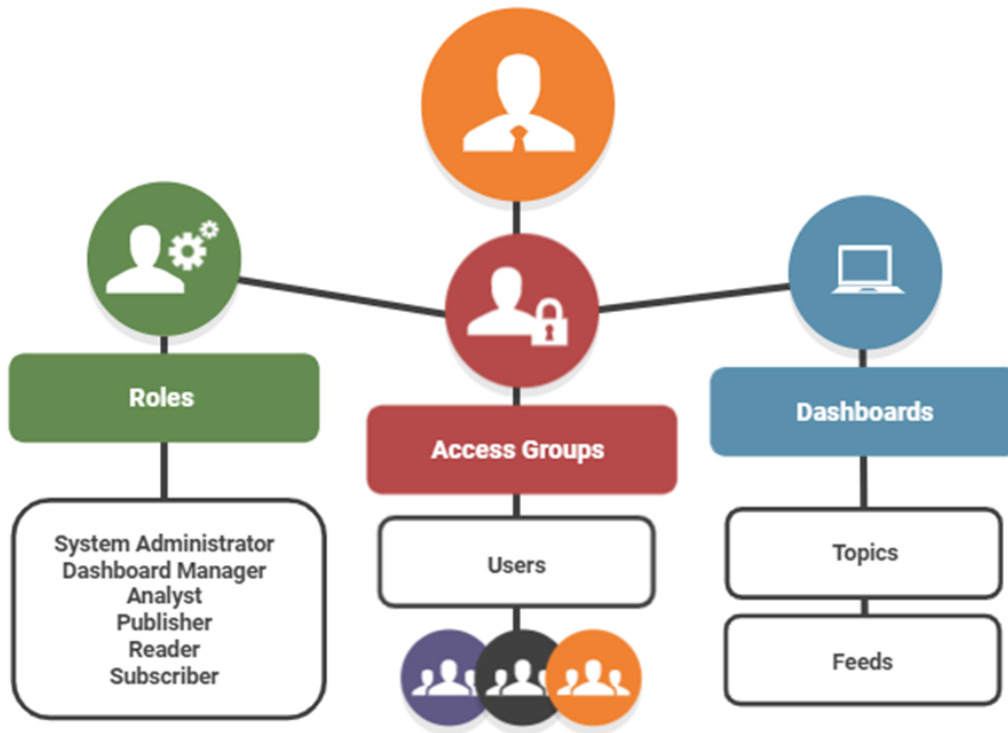


Image: Roles, Access Groups and Dashboards

Further information about Intelligence2day® Security can be found in the White Paper *Security in Intelligence2day®*.

2.3.1 Single Sign on

Single Sign-On (SSO) is a software authentication method which enables a user to log in once and gain access to the resources of multiple systems. Intelligence2day® supports Idp initiated SSO using SAML 2.0

ABOUT COMINTELLI

Comintelli is a Swedish software company which sells Intelligence Software that converts unstructured Big Data content into organized, digestible information for decision-making.

The award-winning solution Intelligence2day® acts as an insight engine to help customers make faster and more confident decisions.

Founded in 1999 and with extensive intelligence experience, Comintelli continues to develop user-friendly solutions that shortens Time-To-Insights.

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