



# JBoss Community

## Content Repository API for Java™ (JCR) & ModeShape

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# Agenda

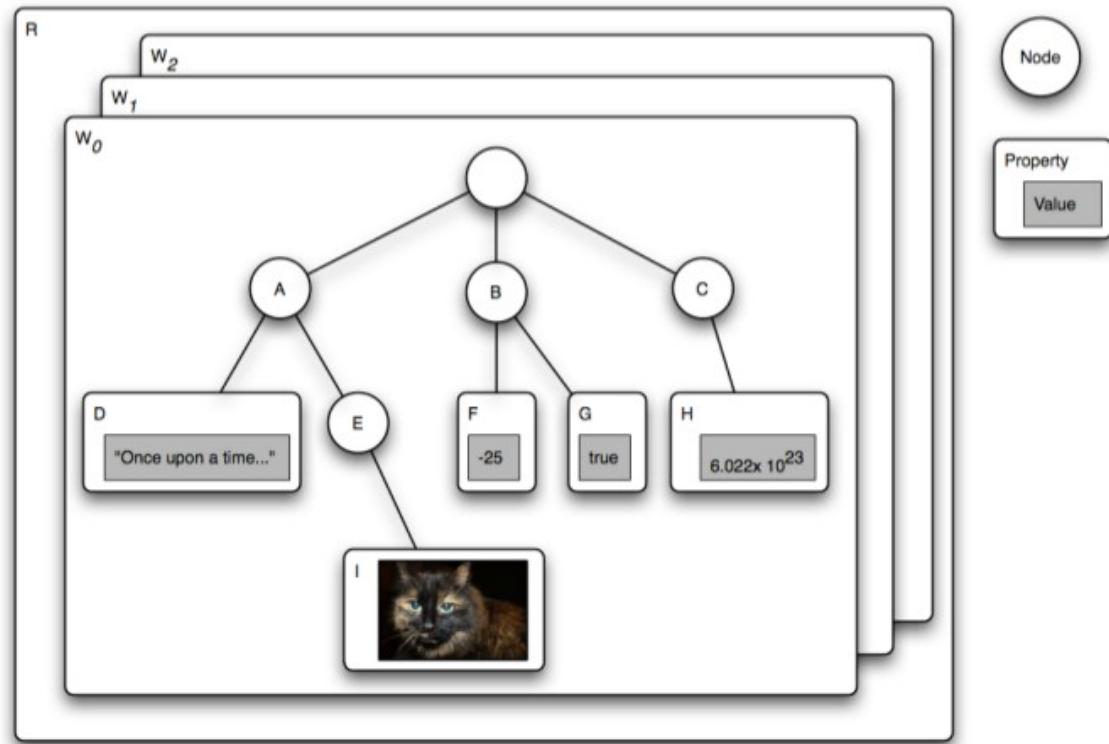
- JCR – what is it (good for)
- ModeShape – beyond JCR
- How do we use JCR and ModeShape

# Content Repository API for Java™

- Simple answer:  
JSR-170, JSR-283 → javax.jcr API
- OK, few more details:
  - Abstracts where and how the content is stored
  - Best things from databases and file systems  
+ additional features
- Typical uses: CMS, portals, knowledge bases,  
artifact repositories, ...

# Basic Concepts

- Repository
- Workspace
- Node
- Property
- Node Type
- Path / UUID
- Session
- Namespace registry
- Node type manager
- Version manager
- Lock manager
- ...



# API Example

```
Map<String,String> parameters = ...
Repository repository = null;

for (RepositoryFactory factory : ServiceLoader.load(RepositoryFactory.class)) {
    repository = factory.getRepository(parameters);
    if (repository != null) break;
}

SimpleCredentials credentials = new SimpleCredentials("user", "password".toCharArray());
String workspaceName = "myWorkspace";
Session session = repository.login(credentials, workspaceName);

Node root = session.getRootNode();

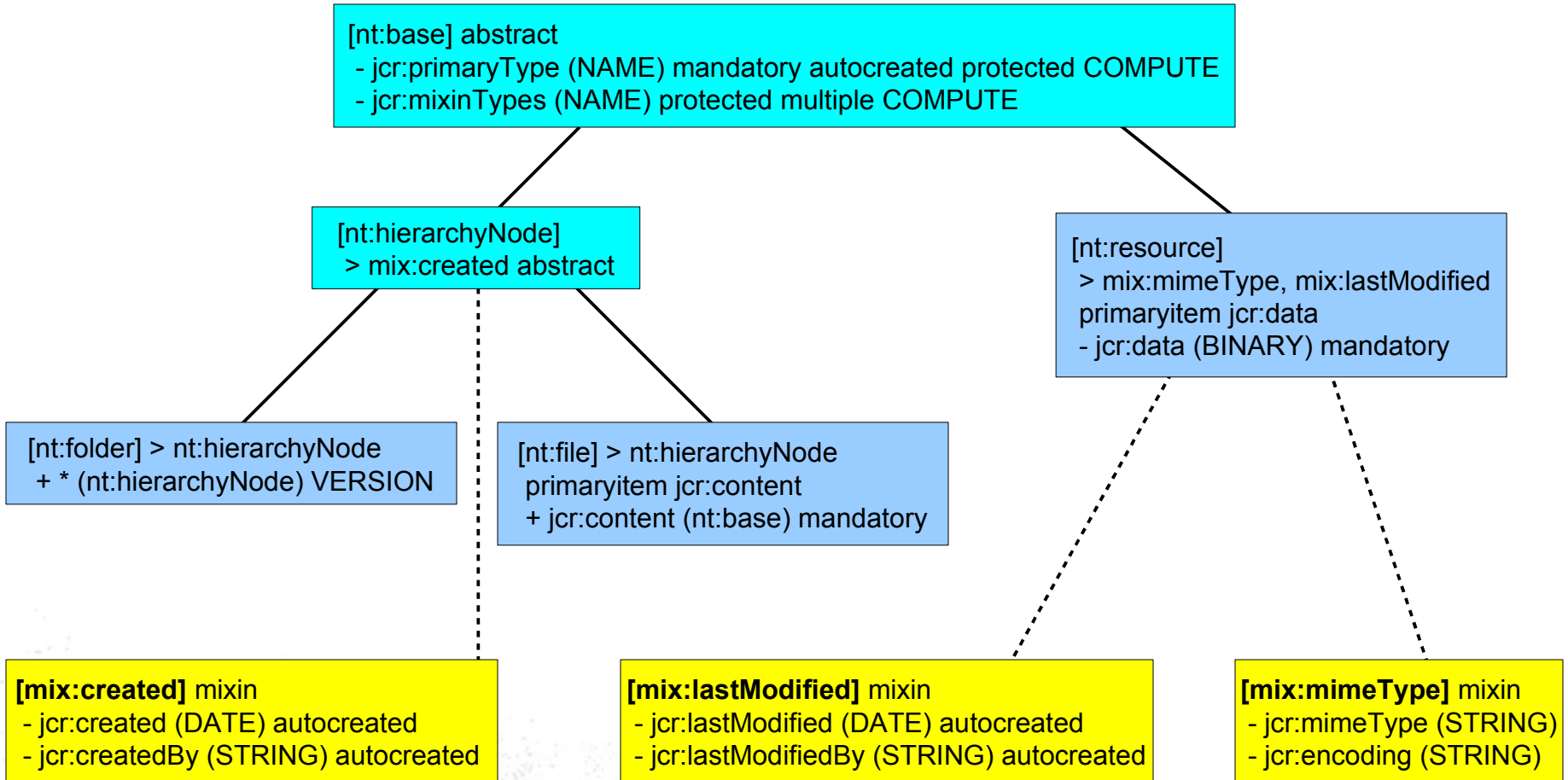
NodeIterator iterator = root.getNodes();
int i = 1;
System.out.println("The Node has " + iterator.getSize() + " subnode(s).");
while (iterator.hasNext()) {
    Node nn = iterator.nextNode();
    System.out.println("Subnode #" + i++ + ": " + nn.getName());
}
```

# Node Types

- Defines the structure of the node
- Supertype(s)
- Primary node type / mixin node type
- Property names and types
  - STRING, URI, BOOLEAN, LONG, DOUBLE, DECIMAL, BINARY, DATE, NAME, PATH, REFERENCE, WEAKREFERENCE
- Child nodes and their (node) types



# Node Type Example



# Query Languages

- *XPath*
- ~~JCR-SQL~~
- JCR-SQL2

SQL	JCR-SQL2
table	node type
column	property
row	node

- JCR-JQOM



# JCR-SQL2 Examples

```
SELECT * FROM [car:Car] WHERE [car:model] LIKE '%Toyota%' AND [car:year] >= 2006
```

```
SELECT [jcr:primaryType],[jcr:created],[jcr:createdBy] FROM [nt:file]  
WHERE NAME() LIKE $name
```

```
SELECT file.*,content.* FROM [nt:file] AS file  
JOIN [nt:resource] AS content ON ISCHILDNODE(content,file)  
WHERE NAME(file) LIKE 'q*.2.vdb'
```

# JCR-JQOM Example

```
// SELECT * FROM [car:Car] WHERE [car:model] LIKE '%Toyota%' AND [car:year] >= 2006

// Get QueryManager and factories
QueryManager queryManager = session.getWorkspace().getQueryManager();
QueryObjectModelFactory factory = queryManager.getQOMFactory();
ValueFactory valueFactory = session.getValueFactory();

// Create the FROM clause: a selector for the [car:Car] nodes ...
Selector source = factory.selector("car:Car", "Cars");

// Create first part of the WHERE clause ([car:model] LIKE '%Toyota%')
PropertyValue model = factory.propertyValue("Cars", "car:model");
MyLiteral toyota = new MyLiteral(valueFactory.createValue("%Toyota%"));
Constraint first = factory.comparison(model, QueryObjectModelConstants.JCR_OPERATOR_LIKE, toyota);
// Create second part of the WHERE clause ([car:year] >= 2006)
PropertyValue year = factory.propertyValue("Cars", "car:year");
MyLiteral i2006 = new MyLiteral(valueFactory.createValue(2006));
Constraint second = factory.comparison(year, QueryObjectModelConstants.JCR_OPERATOR_GREATER_THAN_OR_EQUAL_TO, i2006);
// create complete WHERE clause (using AND)
Constraint complete = factory.and(first, second);

// Create the query ...
QueryObjectModel query = factory.createQuery(source, complete, null, null); // we don't need orderings and select
// Execute the query and get the results ...
QueryResult result = query.execute();

// Iterate over the nodes in the results ...
javax.jcr.NodeIterator nodeIter = result.getNodes();
while ( nodeIter.hasNext() ) {
    Node node = nodeIter.nextNode();
}
// ...
}
```

# Advantages

## (Why To Use JCR)

- Standard API
- Flexible data structure
- Hierarchical graph-based storage
- Search & query
- Versioning
- Access control
- Referential integrity, locking, events, ...

# Implementations

- Jackrabbit (Apache)
- CRX (Day Software / Adobe)
- ModeShape
  
- Alfresco
- eXo Platform (*donated to the Jboss Community*)
- Oracle Beehive

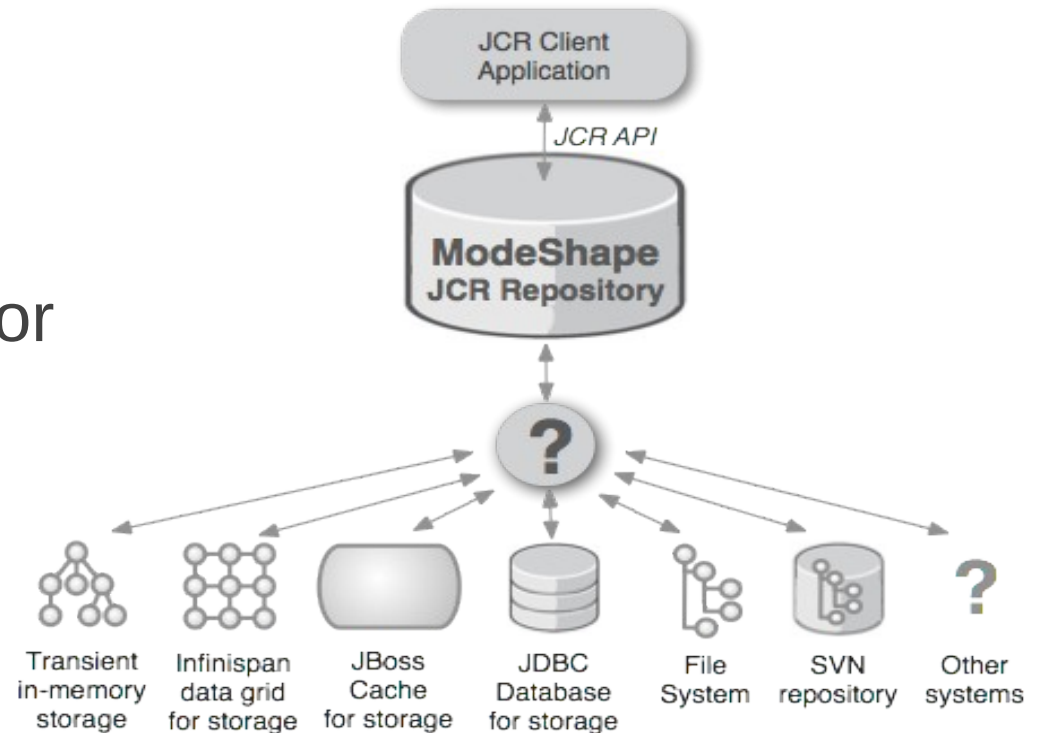
# ModeShape

- JCR 2.0 implementation (all required & most of the optional features)
- Own Graph API
- Sequencers
- Connectors (storage/access)
- **Federation**
- RESTful API
- Clustering
- ...



## Storage Options

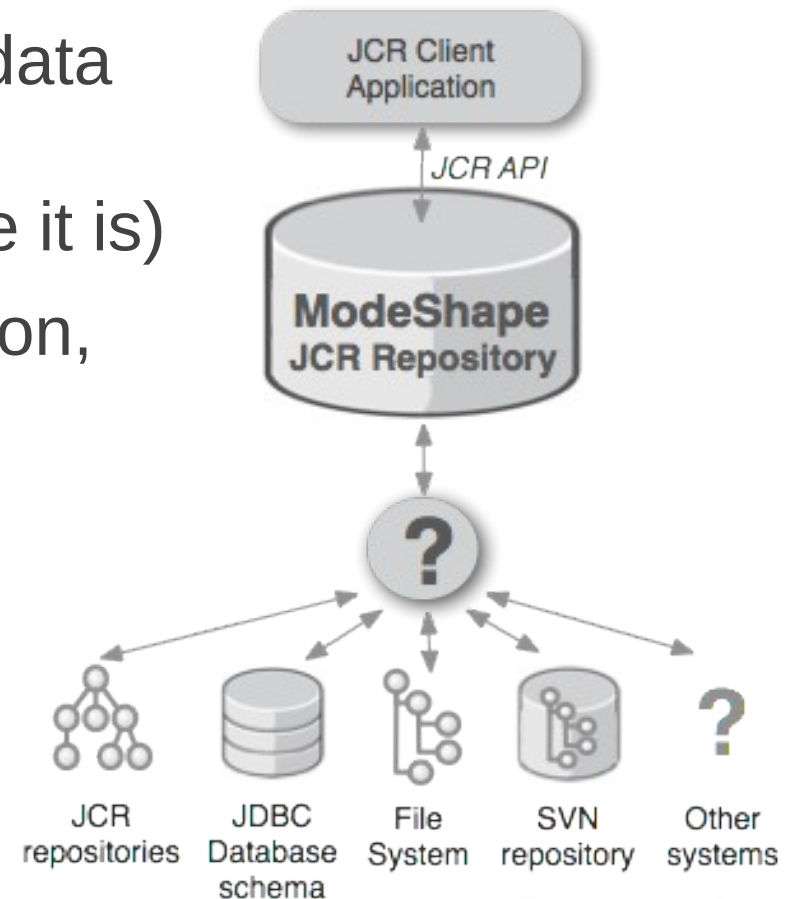
- Multiple out-of-the-box connectors
- Easy to write your own connector





## Connectors

- Use JCR API to access data from other systems (but leave the data where it is)
- E.g. filesystem, Subversion, JDBC metadata, ...





# Federation

- Virtual repository with projected workspaces from real repositories
- Use the best data store for each kind of data
- Combination of own and external data
- Consistent use of JCR API

## Sequencers

- Extract meaningful data from various file formats
- Many out-of-the-box:
  - ZIP, JAR, EAR, WAR files
  - Java class and source files
  - DDL files
  - XML files
  - Microsoft Office documents
  - Image metadata (JPEG, GIF, BMP, PCX, PNG, IFF, ...)
  - MP3
  - and more
- Easy to implement custom sequencers

## Extended JCR-SQL2

- ModeShape supports complete JCR-SQL2 language as defined in specification, plus:
  - Additional joins (FULL OUTER, CROSS)
  - Subqueries in criteria
  - SELECT [DISTINCT]
  - UNION/INTERSECT/EXCEPT [ALL]
  - LIMIT and OFFSET
  - DEPTH and PATH criteria
  - REFERENCE criteria
  - IN and NOT IN
  - BETWEEN val1 [EXCLUSIVE] AND val2 [EXCLUSIVE]
  - Arithmetic expressions in criteria

## Other Features

- RESTful service
- WebDAV service
- JDBC driver
  - Connects to one workspace
  - `jdbc:jcr:http://{hostname}:{port}/modeshape-rest/?repositoryName={name}&user=...`
- *JOPR* RHQ plugin
- Eclipse plugin (JBoss Tools)

# Why Use ModeShape?

- Use the data you already have
- Leave the data where it is
- Sequencers (automatized extraction of content)
- Federation
- Standard JCR API – and beyond
- Light-weight, embeddable, clusterable
- Fast development process
- Backed up by a big open-source company

# JCR, ModeShape and jboss.org

- <http://www.jboss.org/modeshape>
- Old name was JBoss DNA
- Work in progress on empowering JBoss Community services with the strength of ModeShape
  - [downloads.jboss.org](http://downloads.jboss.org)
  - [docs.jboss.org](http://docs.jboss.org)
  - [search.jboss.org](http://search.jboss.org)
- Use in other JBoss projects/products

# Magnolia CMS & ModeShape

- JCR based open-source (Java) CMS
- By default on Apache Jackrabbit
- Modular
- From v.4.2.2 supports ModeShape
- Goal: “Native” support for downloads.jboss.org

The screenshot displays the Magnolia CMS administration interface. The top header includes the Magnolia logo with the tagline "Simple is beautiful" and the user information "User: superuser | Logout". On the left, there is a vertical navigation menu with categories like Website, Data, Documents, Inbox, Forums, Templating Kit, Security, Configuration, Tools, Packager, and Magnolia Store. The main content area shows a table of pages with the following columns: Page, Title, Status, Template, and Mod. date.

Page	Title	Status	Template	Mod. date
interviews	Interviews with JBoss C	●	Community	09-04-01, 12:57
books	Books	●	Community	11-01-14, 10:27
eula	EULA	●	Community	10-02-05, 07:39
help	Help	●	Community	09-12-07, 13:58
lostpassword	Help: Retrieving a Lost	●	Community	10-09-02, 09:14
userprofile	Help: Editing your User	●	Community	10-09-02, 09:22
forums	Help: Using the Forum:	●	Community	09-02-27, 17:02
newforums	Help: Using the New Fr	●	Community	09-12-09, 18:56
layout	Help: Forum Layout	●	Community	09-12-10, 09:35
editingprofile	Help: Editing your profi	●	Community	10-01-19, 06:20
watchingtopicsforums	Help: Watching topics	●	Community	09-12-09, 19:02
creatingtopic	Help: Creating a topic	●	Community	09-12-09, 17:41
creatingannouncement	Help: Creating an ann	●	Community	09-12-09, 17:39
creatingpoll	Help: Creating a poll	●	Community	09-12-09, 19:15
postingreply	Help: Posting a reply	●	Community	09-12-09, 17:29
editingpost	Help: Editing a post	●	Community	09-12-09, 17:23
moderatingforum	Help: Moderating a for	●	Community	09-12-11, 09:48
permissions	Help: Forum Permissio	●	Community	09-12-11, 10:08
contactingusers	Help: Contacting Users	●	Community	09-12-09, 20:20
redirectinguris	Help: Redirecting URLs	●	Community	09-12-10, 09:51
forumetiquette	Help: Forum Etiquette	●	Community	09-12-09, 20:38
wiki	Help: Using the Wiki	●	Community	10-08-04, 04:24
mailinglists	Help: Using the Mailing	●	Community	09-02-27, 16:57
testingreleases	Help: Testing Release	●	Community	09-02-27, 16:03

At the bottom of the interface, there is a toolbar with buttons for "Open page...", "New page", "Activate changes", "De-activate", and "Refresh".



# ModeShape & JBoss Projects

- Teiid
- Drools
- SOA Platform
- BRMS
- ...

# Summary

- JCR API is standard, simple and easy-to-use
- ModeShape is JCR implementation, and adds important extensions
- jboss.org eats its own dogfood ;-)

# Links

- <http://www.jboss.org/modeshape>
- <http://www.jcp.org/en/jsr/detail?id=283>
- <http://www.magnolia-cms.com/>
- Freenode IRC: #modeshape
- Twitter:
  - @modeshape
  - @magnolia\_cms
  - @jbossorg
  - @jchochol

# Czech JBoss User Group

**Now in your city!**  
**Come to the first session on March 2<sup>nd</sup>**  
**at 6 p.m., FI MU**



**Kick-off planned: RESTEasy**

# Questions



# Thank You!

	D2	D3	A107
9:00-9:45	Perl packaging for developers – Marcela Mašláňová	MythTV - User view – Lukáš Doktor	
9:50-10:35	Java packaging for developers – Stanislav Ochoťnický	Gnome 3.0 (r)evolution - Tomáš Bžatek	
10:40-11:25	JCR + ModeShape - Jozef Chocholáček	Plasma Workspaces 4 by KDE – Lukáš Tinkl, Jaroslav Řezník	Power management – Jaroslav Škarvada, Jan Včelák
11:30-12:30	Lunch	Lunch	Lunch
12:30-13:15	Planning and Scheduling with Drools - Lukáš Petrovický	Spice - Jonathan Blandford	Introduction to Qt development – Jaroslav Řezník
13:20-14:05	Teiid - data virtualization system - Boris Belovic	Beyond init: systemd - Lennart Poettering	Remote Desktop – Adam Tkáč
14:10-14:55	PicketLink and PicketBox - Peter Škopek	Discussion: Bootloader and Dracut Future Plans - Harald Hoyer (session ends 10 minutes sooner)	Bug hunting & static analysis – Ondřej Vašík and Petr Muller
15:00-15:45	Web Services for Remote Portlets - Michal Vančo		System vs. Session – David Zeuthen
15:50-16:35	Infinispan: The future of open source data grids – Radoslav Husár, Michal Linhard		SysVinit, upstart and systemd in Fedora and RHEL – Petr Lautrbach
16:40-17:25	Deltacloud API – Michal Fojtik		Modern Linux Desktop alphabet – Tomáš Bžatek, Jaroslav Řezník