



**adaptTo()**

APACHE SLING & FRIENDS TECH MEETUP  
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Ease Development  
with Apache Sling File System Resource Provider  
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# About the Speaker

- AEM Developer
- Apache Sling PMC
- CTO of pro!vision GmbH



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# Agenda

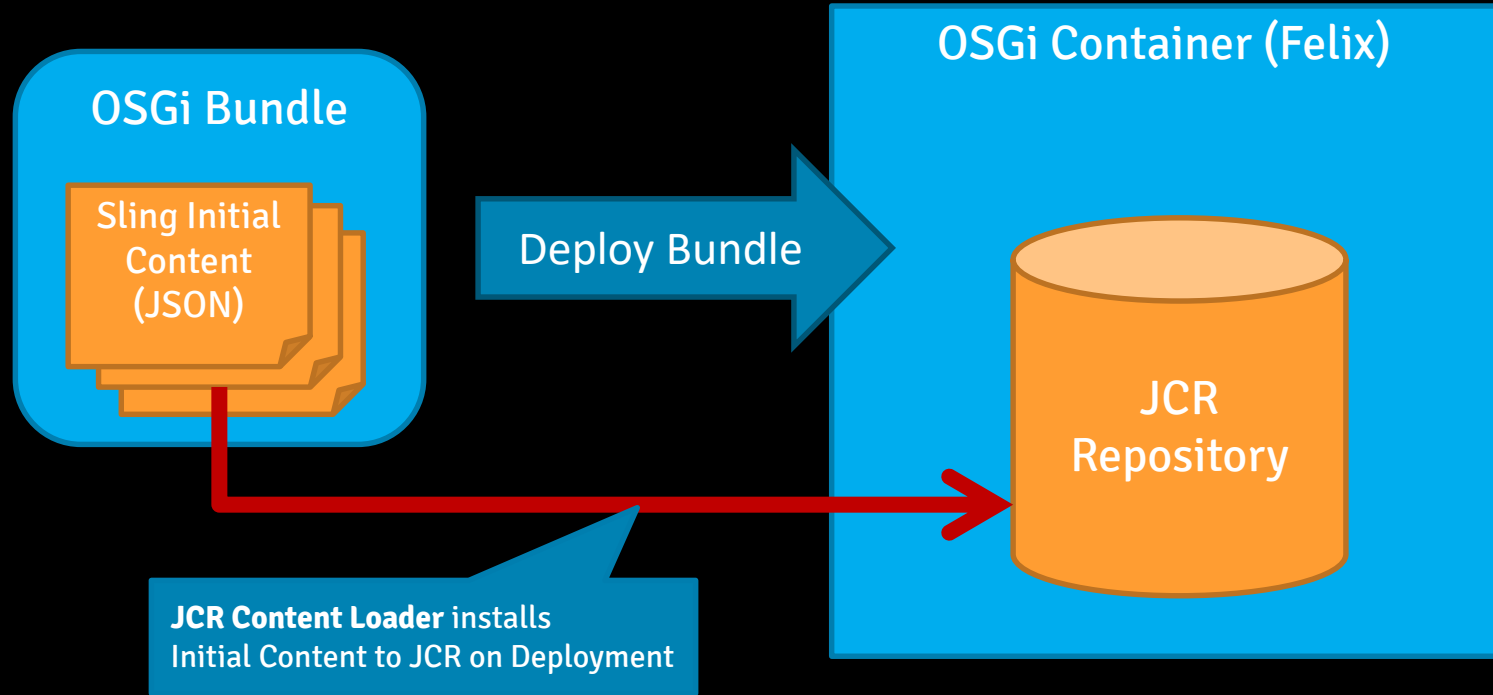
- JCR Content Loader
- File System Resource Provider
- Special Features
- Limitations & Comparison
- Conclusion
- **Goal: Ease Sling/AEM Development**

# JCR Content Loader

# Apache Sling JCR Content Loader

- OSGi Bundle contains JCR Content – which is copied to repository on bundle install
- JCR Content in JSON Format
- Alternative to AEM Packages for Application Content

# Content Loading Concept



# Sling-Initial-Content header

- Content files part of bundle JAR File
- Bundle manifest header:

```
<plugin>
  <groupId>org.apache.felix</groupId>
  <artifactId>maven-bundle-plugin</artifactId>
  <configuration>
    <instructions>
      <Sling-Initial-Content>
        SLING-INF/app-root;overwrite:=true;path:=/apps/myapp
      </Sling-Initial-Content>
    </instructions>
  </configuration>
</plugin>
```

Maps bundle classpath SLING-INF/app-root  
to repository path /apps/myapp

# Advantages

- Java Code and Scripts, Node definitions together in a single Maven Project
- JSON more compact and better readable than FileVault XML
- JCR Primary Type definitions can be omitted in most times



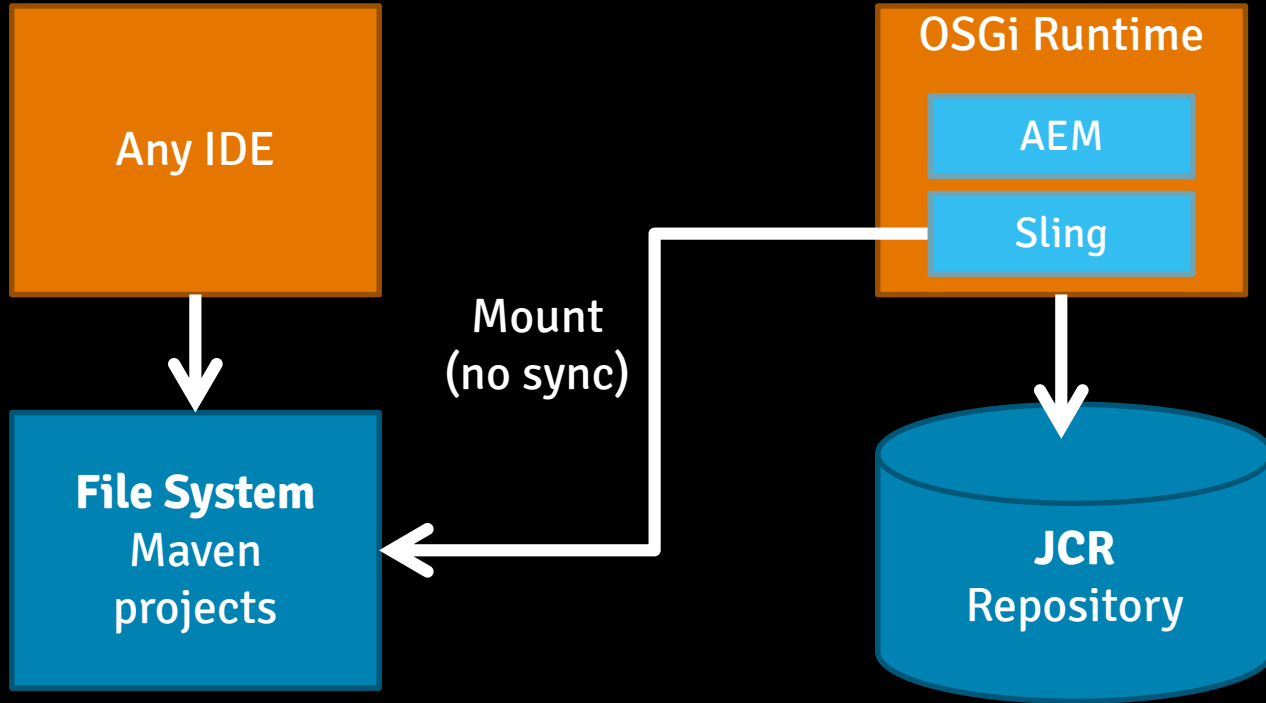
- Maven Project Layout
- Bundle Plugin Instructions
- Application content as JSON files
- Deployment with Maven Sling Plugin
- Deployment with Complete Package

# File System Resource Provider

# File System Resource Provider (FSResource)

- Mounts a file system path into the Sling Resource Hierarchy
- Maps files and folders to `nt:file` and `nt:folder`
- Supports JSON Content Fragments
- Supports FileVault XML layout

# FSResource Conceptual View



# Advantages

- Does not depend on an IDE Plugin – works with all IDEs
- Changes get visible immediately
- No synchronization between Filesystem and JCR required – no sync problems

# Enable FSResource

- Convenience goal in Maven Sling Plugin
  - Adds the required OSGi configuration
  - Maps the local filesystem path
  - Deploys the necessary bundles

```
> mvn sling:fsmount
```

```
> mvn sling:fsunmount
```

- Enable FSResource via Maven Plugin
- Inspect bundles and config
- Make changes to project – static files, JSON fragments, i18n
- Also works with FileVault XML

# Special Features



# JCR Content Loader Special Features

- Overwrite or merge content
- XML descriptors for static files
  - e.g. add `mix:language` to JSON i18n file
- URL Encoding for special chars in node name
- Set ACLs and import principals
- Register node types

# FSResource Special Features

- Three modes
  - Only files + folders
  - Sling-Initial-Content with JSON, XML support
  - FileVault XML layout (Content Packages)
- Cache for parsed content fragments
- Respects Sling-Initial-Content parameters

# FSResource Special Features

- Sends resource events on file changes
- “Mock” JCR API support
  - Simulated JCR access to Resources mapped from file system
  - Only read, no write, no observation
  - Because a lot of AEM code still uses JCR API

# Sling and AEM

- Supports Sling 7, 8, 9
- Supports AEM 6.1, 6.2, 6.3
  - For XML node descriptors (e.g. JSON i18n files) the latest version of JCR Content Loader needs to be deployed to AEM

# Limitations

# FSResource: No JCR Observation

- Services that rely on JCR observation do not get notified on changes
  - HTML Library Manager
    - Workaround: use `?debugClientLibs=true`
  - AEM Component Registry
    - New components not visible
    - Changes to decoration tag or edit config no applied
    - Workaround: redeploy bundle

# FSResource: Resources read-only

- Resource tree is read-only
  - Writing scaled down template thumbnail does not work → template thumbnail not displayed while FSResource is active

# JCR Content Loader: Filter/Merging limited

- Compared to AEM Content Packages the JCR Content Loader lacks some features
  - filter.xml offers more features e.g.  
include/exclude list of regex patterns
  - ACL Merge Handling
  - JCR Content Loader supports `.jcr.xml` files,  
but not full FileVault XML layout

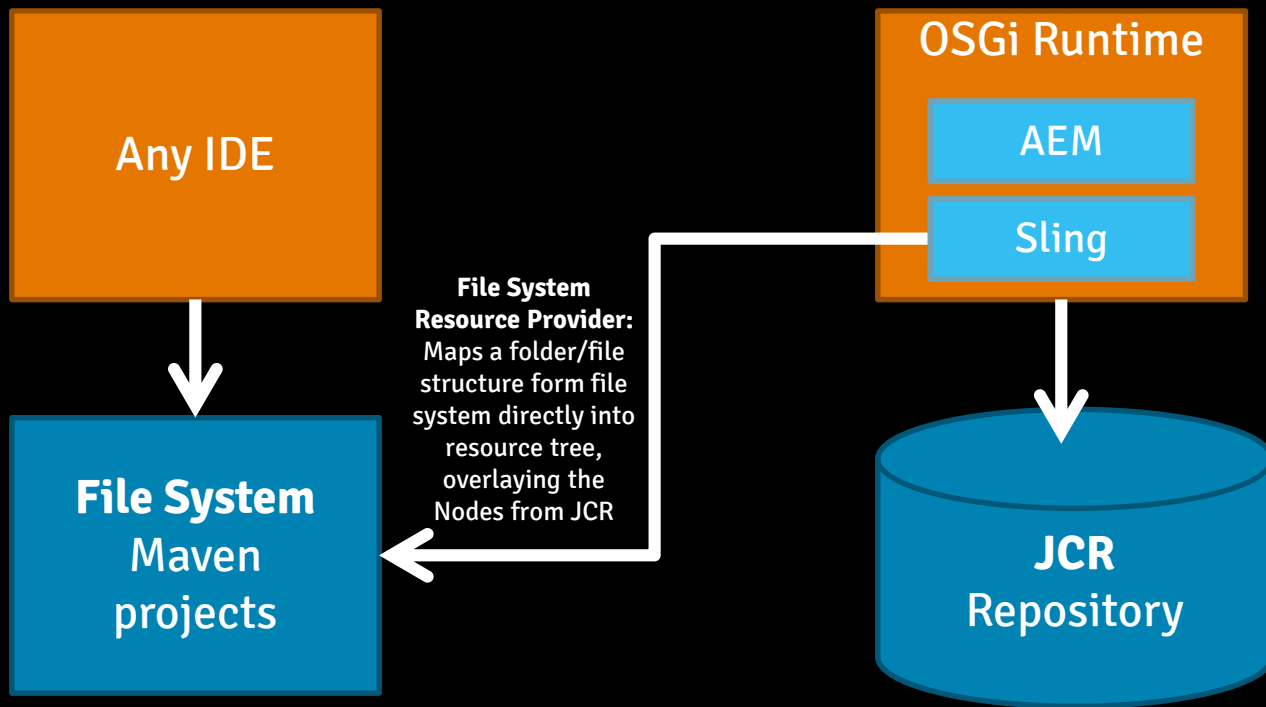


# No (automatic) sync back

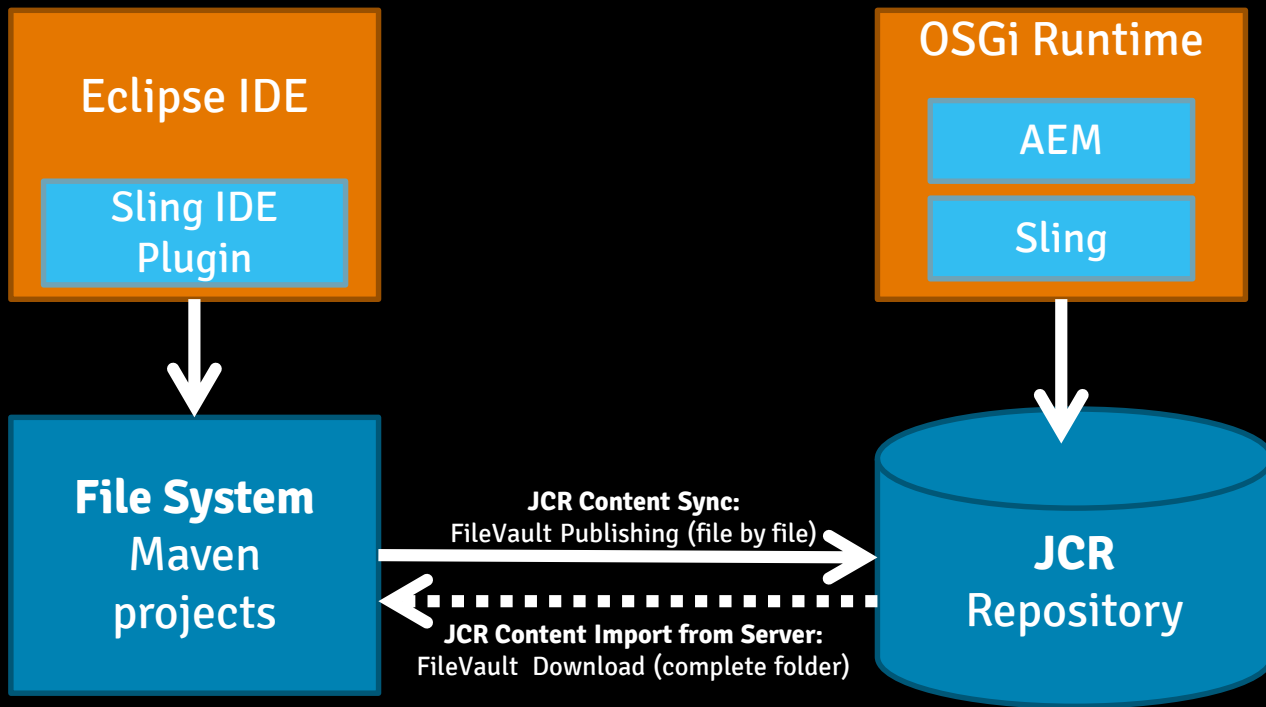
- Changes to your application code done in the Author GUI is not automatically synced back
  - e.g. Template Editor, Design Mode
- Manual sync-back using JSON output of Sling GET Servlet
  - It's exactly the same syntax
  - Cleanup recommended: Remove JCR lastmod info etc.
  - Or use AEM Packages for `/conf` or `/etc/design`

# Comparison

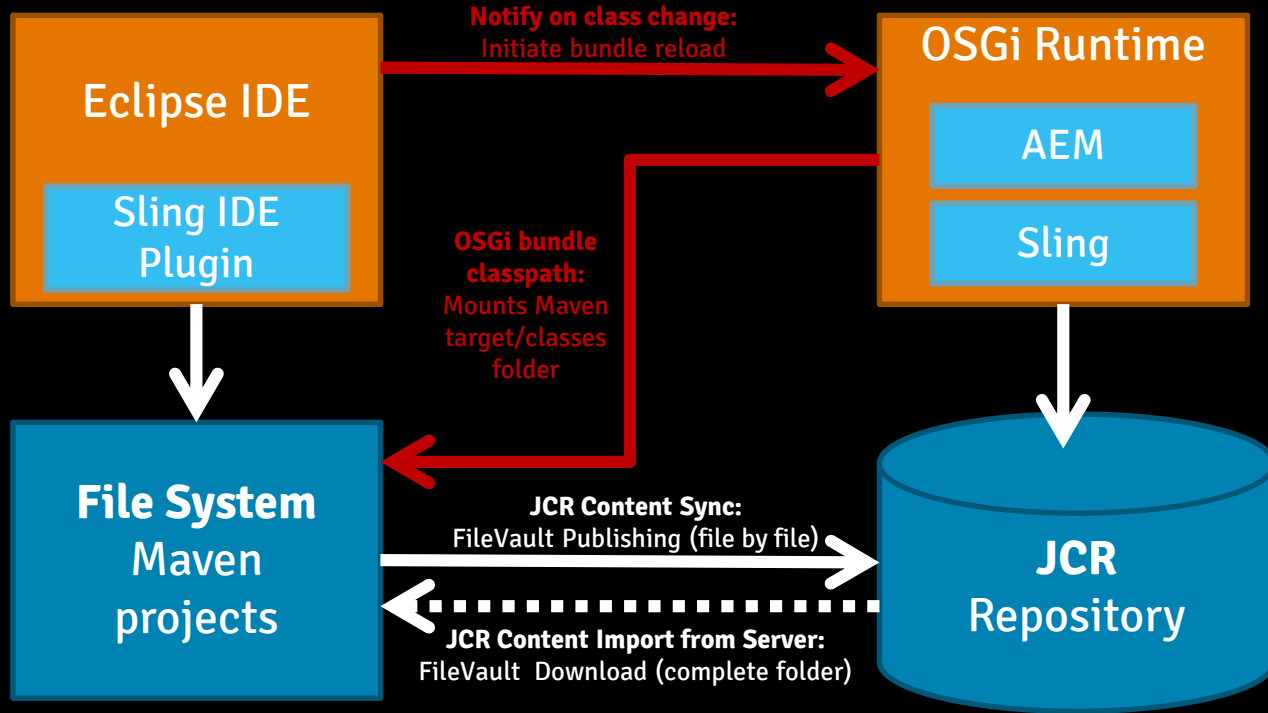
# File System Resource Provider



# Sling IDE Integration: Content Sync



# Sling IDE Integration: Bundle support



# More alternatives

- **Apache Sling Bundle Resource Provider**
  - Feasible only for simple use cases
  - Does not support all features from JCR Content Loader
- **Adobe “repo” Tool**
  - FTP-like tool for FileVault XML JCR content

# Comparison Matrix – Deployment

Topic	FileVault XML Content Package	Sling JCR Content Loader	Sling Bundle Resource Provider
Single Maven Project for App	✗ No	✓ Yes	✓ Yes
Compact, good readable	✓ Yes (XML), more verbose	✓✓ Yes (JSON)	✓✓ Yes (JSON)
All content structures	✓ Yes	✓ Yes	✗ No
ACLs	✓ Yes	✓ Yes	✗ No
Overwrite or merge	✓ Yes	✓ Yes	✗ No
Stored in Repo – JCR/Resource events on deployment	✓ Yes	✓ Yes	✗ No
Filter with include/exclude regex	✓ Yes	✗ No	✗ No
AC Merge Handling	✓ Yes	✗ No	✗ No
AEM Maven Project Archetype	✓ Yes	✗ No (planned)	✗ No

# Comparison Matrix – Sync/IDE Support

Topic	FileVault XML + Sling Eclipse IDE	JCR Content Loader + FSResource	FileVault XML + Adobe “repo” Tool
Changes visible immediately without “manual” sync call	✓ Yes (if enabled)	✓ Yes	✗ No (can configure shortcuts in IDE)
All content structures	✓ Yes	✓ Yes	✓ Yes
ACLs	✗ No ( <a href="#">SLING-3827</a> )	✓ Yes	?
Sling Resource Events on Change	✓ Yes	✓ Yes	✓ Yes
JCR Observation Events on Change	✓ Yes	✗ No	✓ Yes
Potential sync problems	✗ May fail on complex operations, e.g. refactorings	✓ No	✓ No
Supports all IDEs	✗ No	✓ Yes	✓ Yes
Filter include/exclude regex	✓ Yes	✗ No	✗ No



# Conclusion

# Conclusion

- Lots of options – all have some benefits or limitations
- FileVault XML + Sling IDE recommended by Adobe – “de facto” Standard
- Give JCR Content Loader + FS Resource a try!

- Demo project  
<https://github.com/adaptto/2017-ease-development-sling-fsresource>
- Apache Sling File System Resource Provider  
<https://sling.apache.org/documentation/bundles/accessing-file-system-resources-extensions-fsresource.html>
- Apache Sling JCR Content Loader  
<https://sling.apache.org/documentation/bundles/content-loading-jcr-contentloader.html>
- Apache Sling Maven Sling Plugin  
<http://sling.apache.org/components/maven-sling-plugin/plugin-info.html>

# References

- Apache Sling Bundle Resource Provider  
<https://sling.apache.org/documentation/bundles/bundle-resources-extensions-bundlresource.html>
- Adobe “repo” Tool  
<https://github.com/Adobe-Marketing-Cloud/tools/tree/master/repo>
- Sling/AEM Eclipse IDE Tooling  
<https://sling.apache.org/documentation/development/ide-tooling.html>  
<https://docs.adobe.com/docs/en/aem/6-3/develop/dev-tools/aem-eclipse.html>