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EUROPE'S LEADING AEM DEVELOPER CONFERENCE

27th – 29th SEPTEMBER 2021

What's new in AEM Mocks

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About the Speaker

- AEM Developer
- Apache Sling PMC
- Apache Member

Stefan Seifert

https://diva-e.com/

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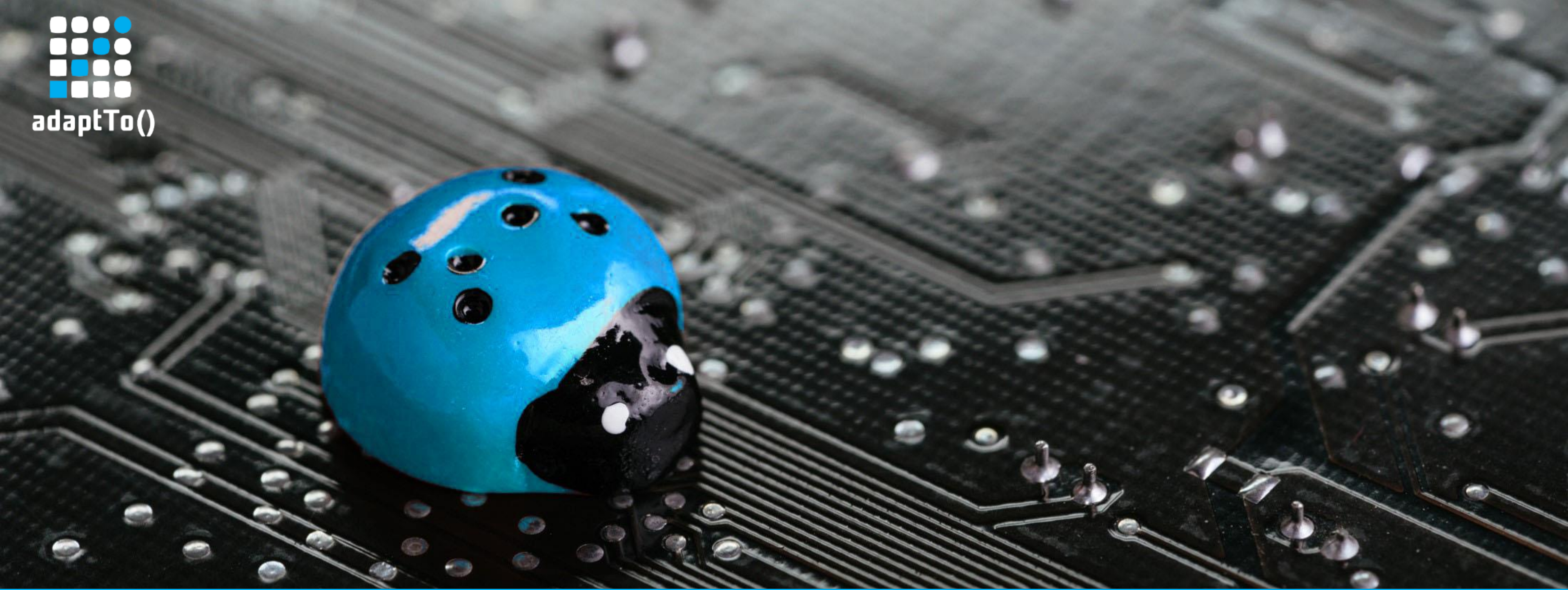

What's AEM Mocks?

About AEM Mocks

- Unit Tests for your AEM Application
- Provides an in-memory AEM environment suitable for Unit Tests
- Covers 90% of what is required for typical AEM applications
- Can be combined with Mockito and others
- Fast test execution

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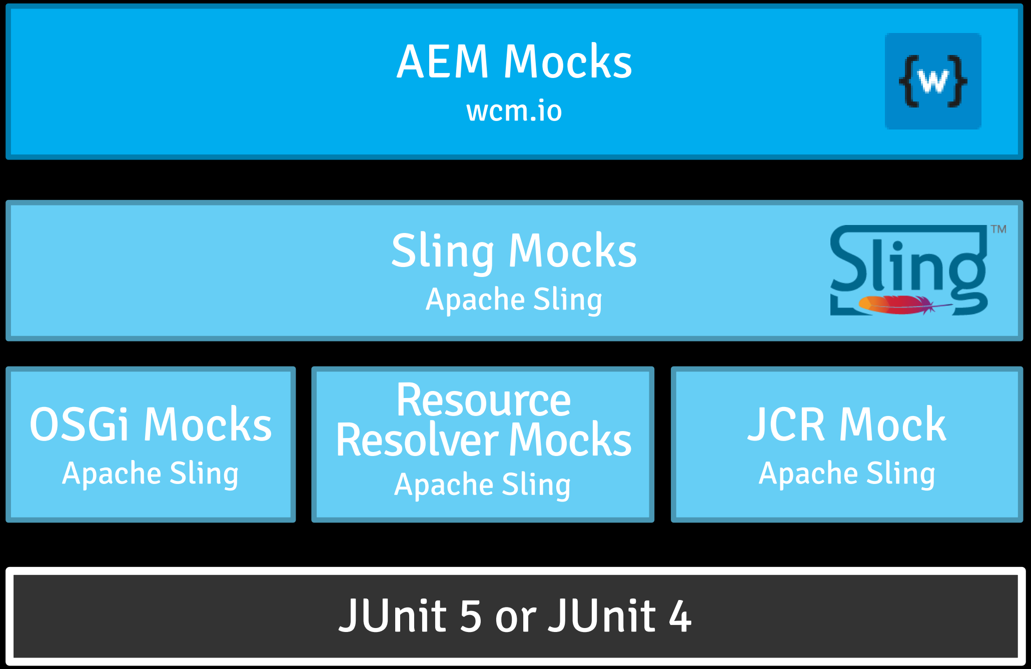
Tech Stack



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Choose Resource Resolver implementation

FASTER

Resource Resolver Type	Sling API	JCR API	Node Types	Obser-vation	JCR Query	Lucene Fulltext
RESOURCE RESOLVER_MOCK	✓	✗	✗	✗ (Sling only)	✗ (mocked)	✗
JCR_MOCK	✓	✓	✗ (mocked)	✗	✗ (mocked)	✗
JCR_OAK *	✓	✓	✓	✓	✓	✗

more features

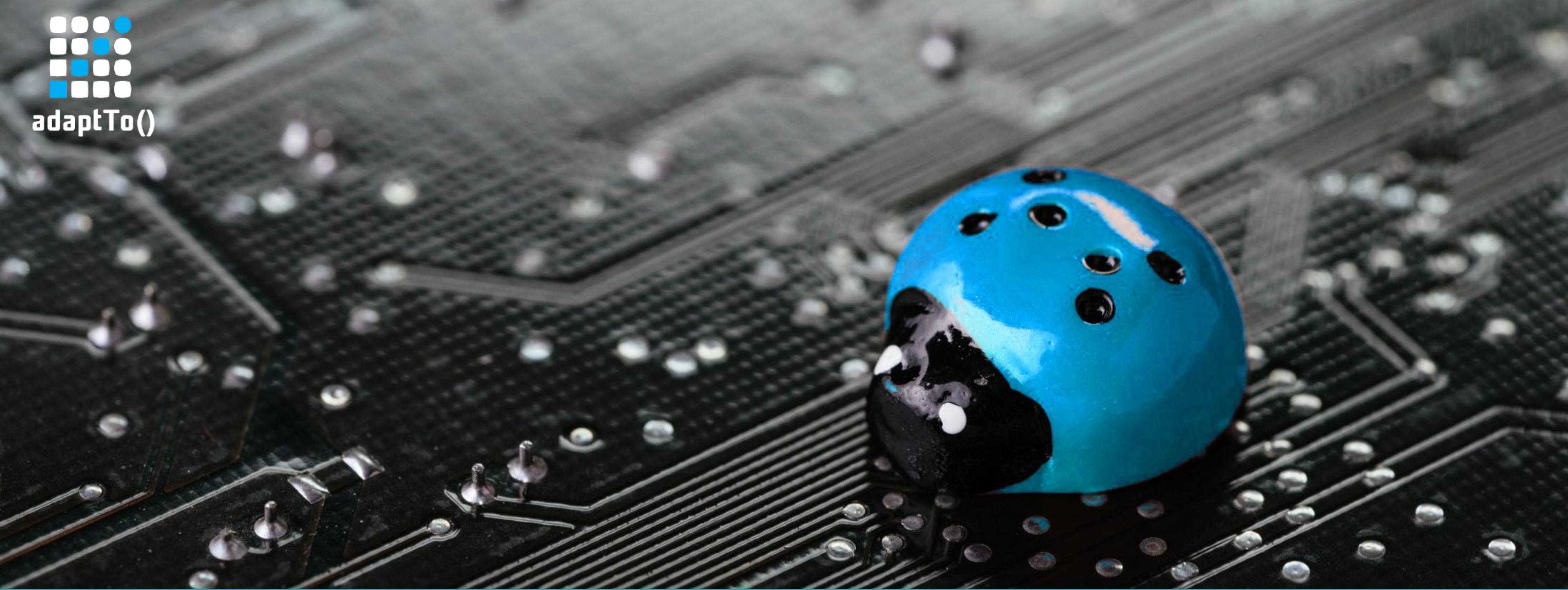
* Requires additional dependency: `org.apache.sling.testing.sling-mock-oak`

General Introduction

Ask the AEM Community Expert Session
March 2019

Unit Testing with AEM Mocks
Ask the AEM Community Expert – Stefan Seifert
PRO!VISION
SOFTWARE CRAFTSMANSHIP

https://github.com/stefanseifert/2019-atace-unit-testing-with-aem-mocks



Your Project – Test Dependency Management

AEM Mocks Test Dependency

```
<dependency>
  <groupId>io.wcm</groupId>
  <artifactId>io.wcm.testing.aem-mock.junit5</artifactId>
  <version>4.1.4</version>
  <scope>test</scope>
</dependency>
```

- Always use latest version
- Do not define additional dependencies to Sling Mocks
- Do not exclude transitive dependencies
  - Transitive dependencies reference required Sling implementation bundles that are not included in AEM API JAR
- POM: Define AEM Mocks dependencies **before** AEM API dependency

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AEM Dependencies

- AEM Mocks compatible with AEM 6.4, 6.5, AEMaaCS
  - Default transitive dependencies for AEM 6.4 (from 2018)
- Ideally, you should test with transitive dependencies exactly from AEM Version you are deploying to

- Use AEM (Cloud) Dependencies from wcm.io https://wcm.io/tooling/maven/aem-dependencies.html
  - For AEMaaCS, AEM 6.x, all service packs

AEM Cloud Dependencies Example

See AEM Cloud Dependencies POM

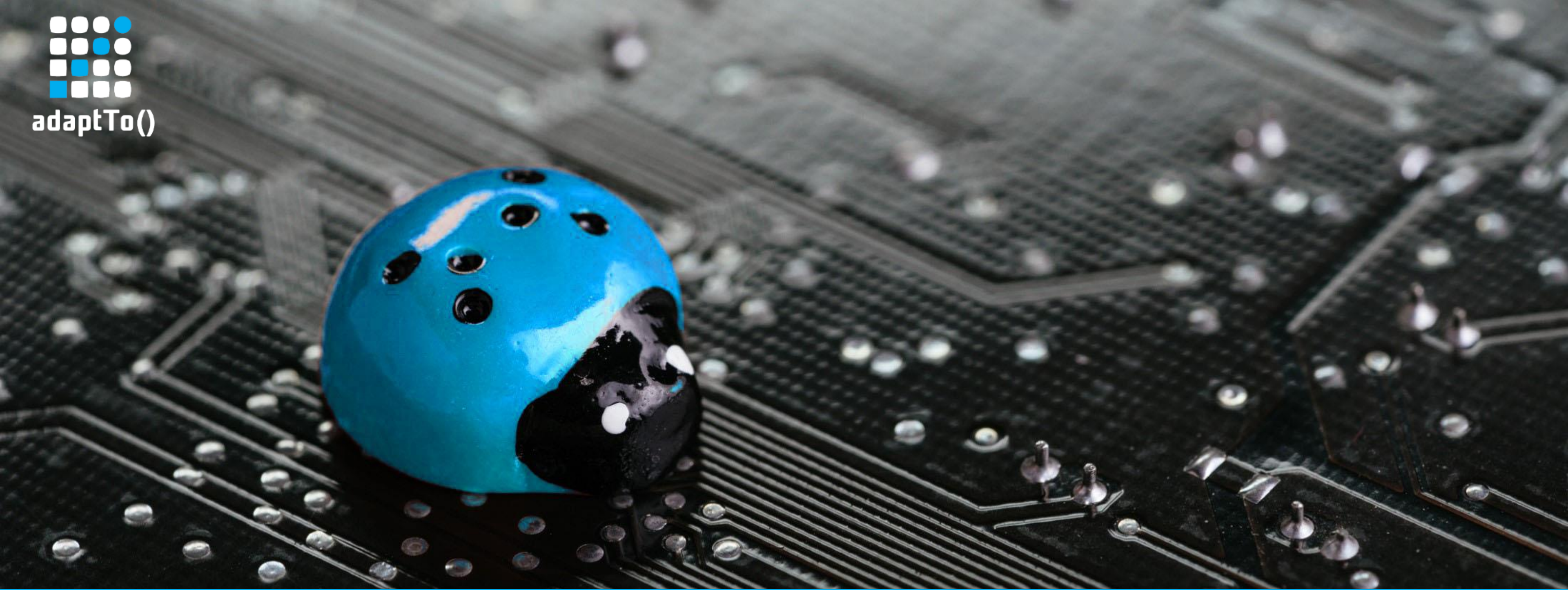
Replace

```
<dependencyManagement>
  <dependency>
    <groupId>com.adobe.aem</groupId>
    <artifactId>aem-sdk-api</artifactId>
    <version>2021.9.5852.20210917T073206Z-210800</version>
  </dependency>
<dependencyManagement>
```

with

```
<dependencyManagement>
  <dependency>
    <groupId>io.wcm.maven</groupId>
    <artifactId>io.wcm.maven.aem-cloud-dependencies</artifactId>
    <version>2021.9.5852.20210917T073206Z-210800.0000</version>
    <type>pom</type>
    <scope>import</scope>
  </dependency>
<dependencyManagement>
```

```
AEM 6.5:
io.wcm.maven:io.wcm.maven.aem-dependencies:6.5.10.0000
```



AEM Mocks Plugins

AEM Mocks Plugins

- Provide “Test Lifecyle Extensions” for non-Standard AEM extensions
  - Registers required OSGi services
  - Provides helper methods
  - List of all plugins https://wcm-io.atlassian.net/wiki/x/EQBjPg

Plugin Definition Example

```
import static org.apache.sling.testing.mock.caconfig.ContextPlugins.CACONFIG;
import static com.adobe.cq.wcm.core.components.testing.mock.ContextPlugins.CORE_COMPONENTS;

@ExtendWith(AemContextExtension.class)
class MyUnitTest {

  private final AemContext context = new AemContextBuilder()
      // register plugins
      .plugin(CACONFIG)
      .plugin(CORE_COMPONENTS)
      // shared context setup code for all tests
      .<AemContext>afterSetUp(context -> {
        // add more setup code here
      })
      .build();

}
```

Registers OSGi services required by Core Components internally

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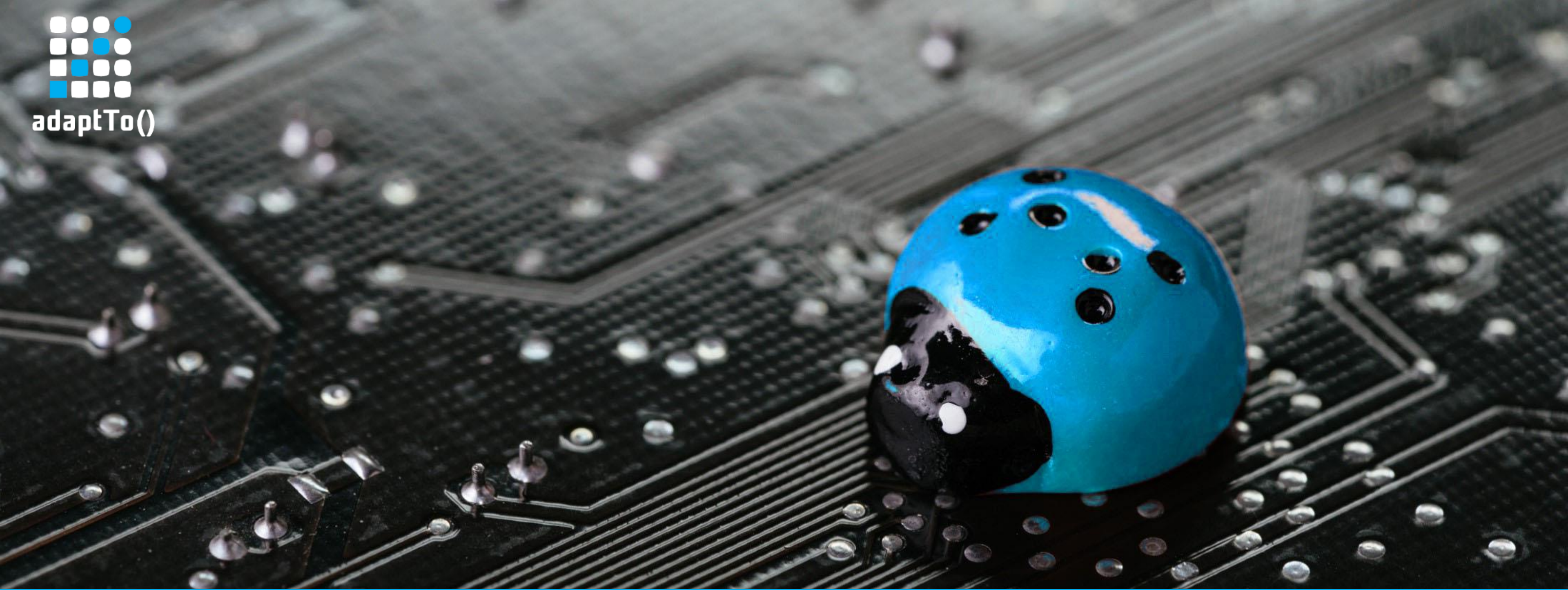
Write Context-Aware Configuration

```java
@Rule
public SlingContext context = new AemContextBuilder()
    .plugin(CACONFIG)
    .build();

@Before
public void setUp() {
  // prepare site with references to conf path
  context.create().resource("/content/region/site", "sling:configRef", "/conf/region/site");
  context.currentResource(context.create().resource("/content/region/site/en"));

  // write a single configuration
  MockContextAwareConfig.writeConfiguration(context, "/content/region/site", SimpleConfig.class,
      "stringParam", "value1");

  // write configuration list
  MockContextAwareConfig.writeConfigurationCollection(context, "/content/region/site", ListConfig.class,
      ImmutableList.of(
          ImmutableMap.<String,Object>of("stringParam", "value1"),
          ImmutableMap.<String,Object>of("stringParam", "value2")));
}
```



Enhanced OSGi Support

Constructor Injection

OSGi Service

```
@Component(service = MyService.class)
public class MyServiceImpl implements MyService {
  private final PageManagerFactory pageManagerFactory;

  // inject OSGI service via constructor
  public MyServiceImpl(
          @Reference PageManagerFactory pageManagerFactory) {
      this.pageManagerFactory = pageManagerFactory;
  }

}
```

Unit Test

```
@BeforeEach
void setUp() {
  // register service in Unit Test
  context.registerInjectActivateService(MyServiceImpl.class);
}
```

Register by Class Name: Works for Constructor and Field Injection

Individual OSGi Dependency Artifacts

In your `<dependencies>` section, instead of

- `org.osgi:`**`osgi.core`**
- `org.osgi:`**`osgi.cmpn`**

Use any of

- `org.osgi:`**`org.osgi.framework`**
- `org.osgi:`**`org.osgi.service.component`**
- `org.osgi:`**`org.osgi.service.metatype`**
- `org.osgi:`**`org.osgi.service.cm`**
- `org.osgi:`**`org.osgi.service.event`**
- …

AEM Mocks uses individual artifacts.

Most used OSGi artifacts
in AEM Cloud Dependencies POM

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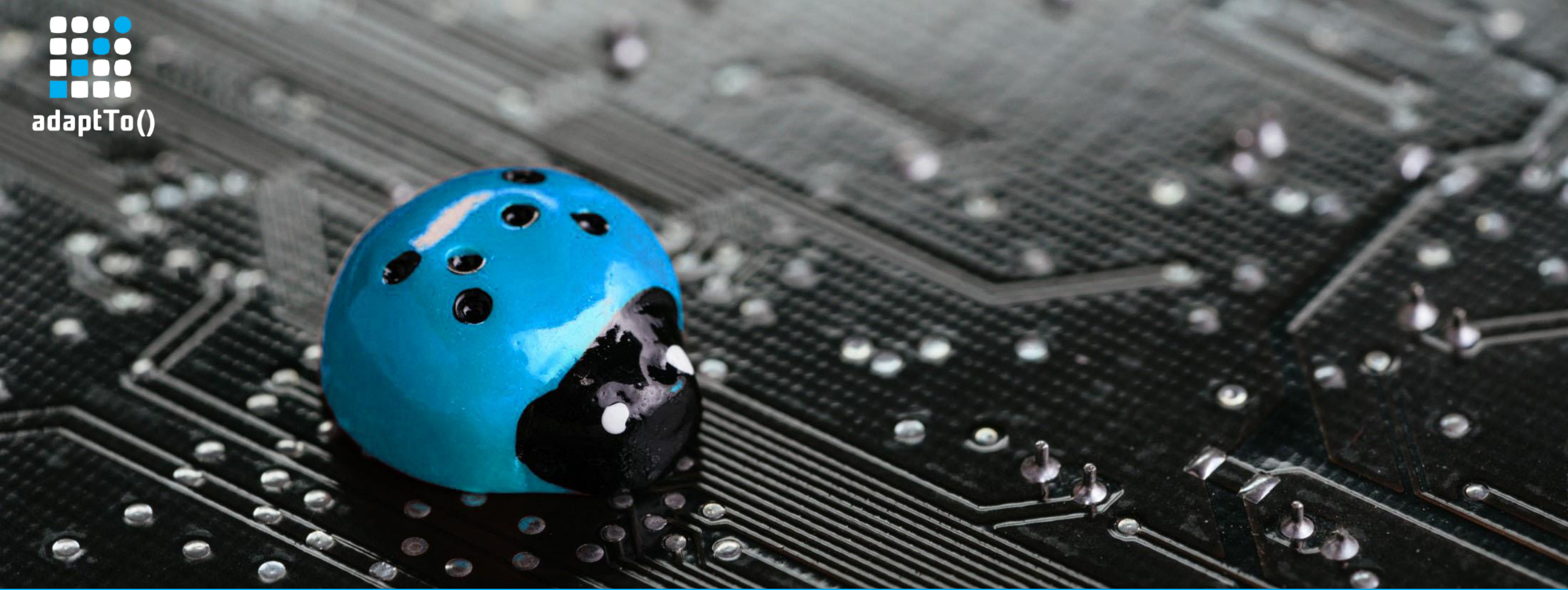

Prepare Test Context Data

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Load Test Data from Files

Points to test class path, or relative path in file system

- Single Files (read/write)

```
// load node structure from single JSON file to path in repository
context.load().json("/json-test-data/content.json", "/content/sample/en");
```

NEW

```
// load node structure from single FileVault XML file to path in repository
context.load().fileVaultXml("/xml-test-data/en/.content.xml", "/content/sample/en");
```

- Mount Folders (read-only)

Uses FSResource

NEW

```
// mount folder with JSON files and binaries to path in repository
context.load().folderJson("src/test/resources/json-test-data", "/content/sample/en");
```

NEW

```
// mount folder with FileVault XML files and binaries to path in repository
context.load().folderFileVaultXml("src/test/resources/xml-test-data", "/content");
```

Create Test Data on-the-fly

```
// create a page with page properties
Page page = context.create().page("/content/site1/en", TEMPLATE,
    JCR_TITLE, "Test Title",
    "customProperty", "value1");

// create a dummy image with web-enabled rendition
Asset asset = context.create().asset("/content/dam/sample1.jpg", 1600, 900, "image/jpeg");
Rendition webEnabledRendition = context.create().assetRenditionWebEnabled(asset);

// create a child resource "component1" in the page
Resource resource = context.create().resource(page, "component1",
    PROPERTY_RESOURCE_TYPE, "myapp/components/text",
    "text", "My Text",
    "fileReference", asset.getPath());
```

JPEG, PNG, GIF supported by default, TIFF and SVG with Java ImageIO plugins.

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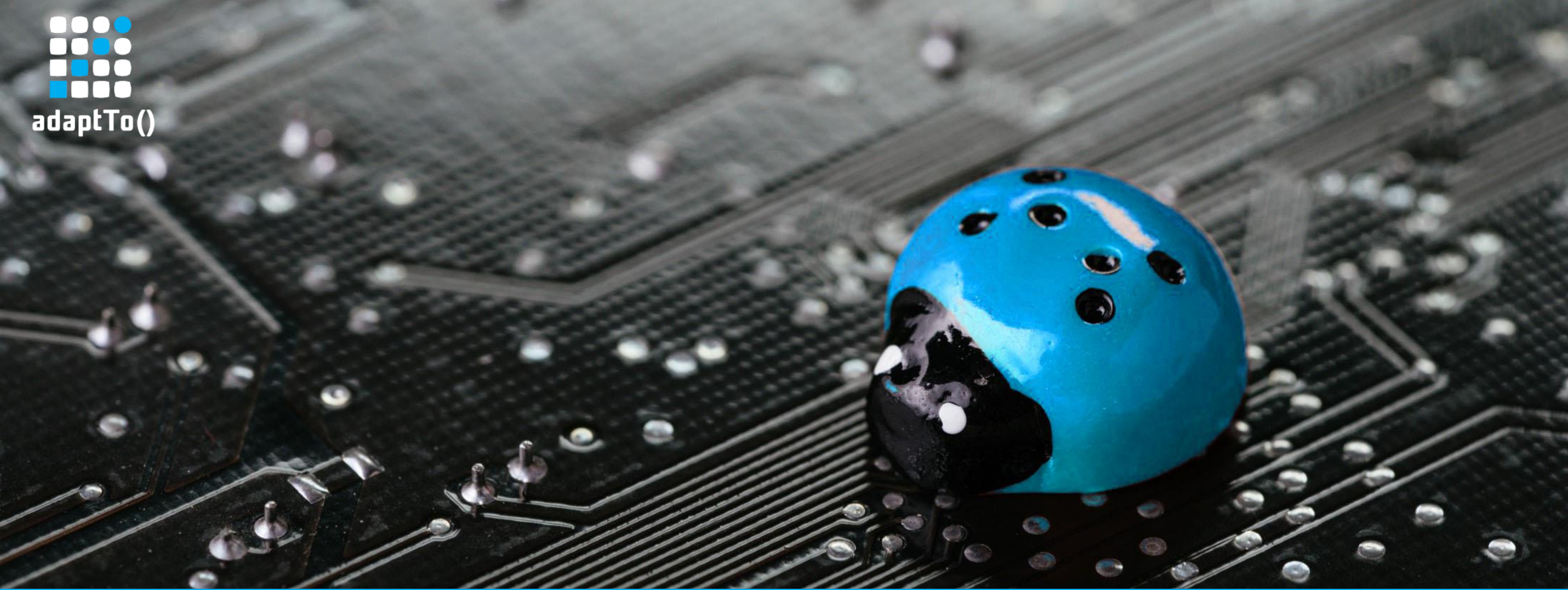

Test Core Component Extensions

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Test Core Component Extensions

Core Components Models can be extended using the [Delegation Pattern]

Component Definition

```
sling:resourceSuperType="core/wcm/components/title/v2/title"
```

Needs to be present in /apps folder in mock repository

Model Class

```
@Model(adaptables = SlingHttpServletRequest.class,
    adapters = Title.class,
    resourceType = "myproject/components/customTitle")
public class CustomTitle implements Title {
  @Self @Via(type = ResourceSuperType.class)
  private Title delegate;
}
```

TitleImpl Core Component class needs to be present in class path

Test Core Component Extensions

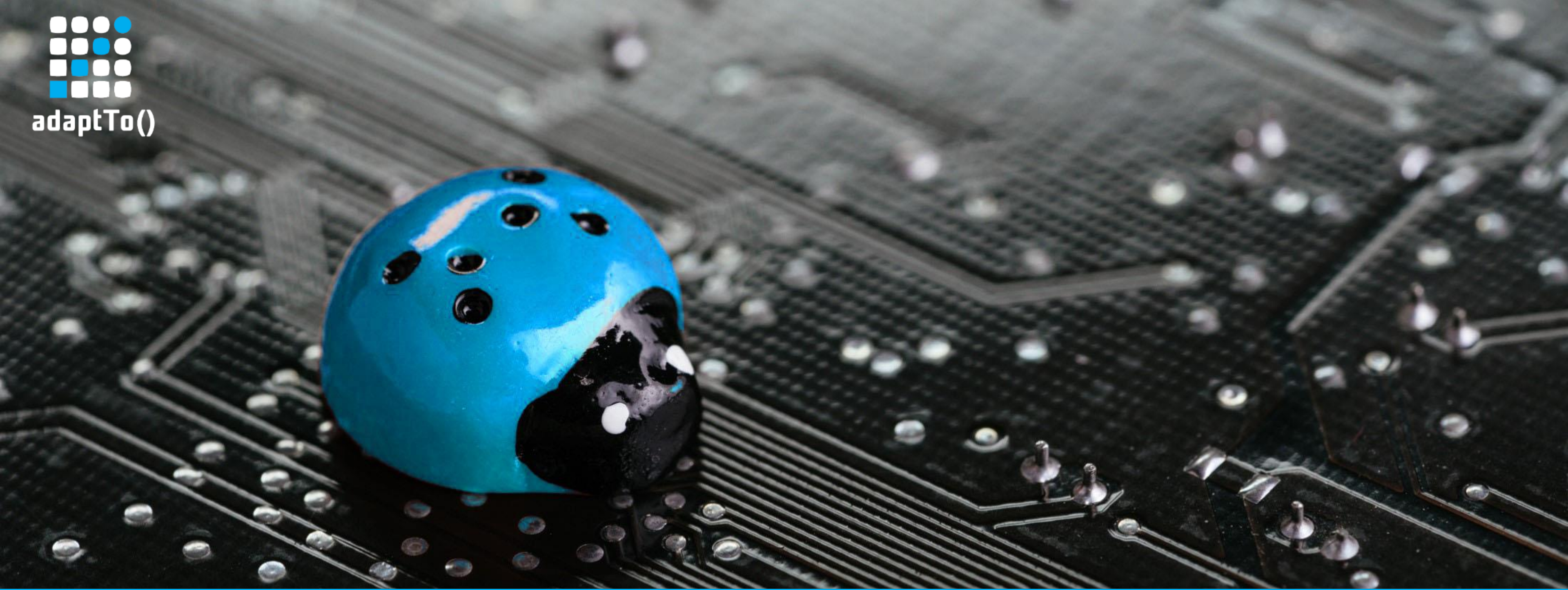
```
@BeforeEach
void setUp() {
  context.create().resource("/apps/myproject/components/customTitle",
      "sling:resourceSuperType", "core/wcm/components/title/v2/title");

  /* alternative:
  context.load().fileVaultXml("../ui.apps/src/main/content/jcr_root/apps/myproject/components/customTitle/.content.xml",
      "/apps/myproject/components/customTitle"); */

  page = context.create().page(SITE_ROOT_PATH);
}

@Test
void testEmpty() {
  context.currentResource(context.create().resource(page, "title",
      PROPERTY_RESOURCE_TYPE, "myproject/components/customTitle",
      JCR_TITLE, "My Title"));

  Title underTest = context.request().adaptTo(Title.class);

  assertEquals("My Title", underTest.getText());
}
```

Resource type hierarchy:

```
myproject/components/customTitle
↳core/wcm/components/title/v2/title
```

Prerequisites:

- Use AEM Mocks Plugin for Core Components
- **core.wcm.components.core** as test dependency



Enhanced AEM Feature Support

Content Policies

Test component with different content policies.

```
// create a content policy with mapping for resource type
context.contentPolicyMapping("app1/componenty/component1",
    "prop1", "value1",
    "prop2", 123);
```

Resource type of component to be tested

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Content Fragments

Creates structured and unstructured content fragments.

```java
// Create structured content fragment
ContentFragment cf = context.create().contentFragmentStructured("/content/dam/cf1",
    "param1", "value1",
    "param2", 123,
    "param3", true,
    "param4", new String[] { "v1", "v2" });

// Create unstructured content fragment
ContentFragment cf = context.create().contentFragmentText("/content/dam/cf2",
    "<p>Text</p>", "text/html");
```

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I18n Resource Bundles

Test code that expects i18n resources

Model Class

```
@Model(adaptables = SlingHttpServletRequest.class)
public class MyModel  {
  @AemObject
  private I18n i18n;

  @PostConstruct
  private void activate() {  // read i18n
    String translation = i18n.get("key1");
    // ...
  }
}
```

Uses wcm.io AEM Sling Models Extension

Unit Test

```
@BeforeEach
void setUp() {  // set i18n key
  ResourceBundle bundle = context.request().getResourceBundle(Locale.ENGLISH);
  ((MockResourceBundle)bundle).put("key1", "My Translation");
}
```

Mock i18n Resource Bundles can be manipulated in Unit Tests

Other new features

- Support for JUnit 5 @BeforeAll and @AfterAll annotations
- Resource Resolver Mock: Provided mocked results for findResources/queryResources
- Mock Asset Manager sends OSGi events
- New Mock implementations of:
  - Sling XSSAPI
  - Sling Feature Flag Service
  - Granite ResourceCollectionManager/ResourceCollection
  - AEM PageManagerFactory
  - AEM LanguageManager
  - AEM Dynamic Media PublishUtils
  - AEM SlingModelFilter
  - AEM Externalizer

References

References 1/2

- wcm.io AEM Mocks
  http://wcm.io/testing/aem-mock/
- Talks
  Ask the AEM Community Expert Session March 2019
  adaptTo() 2018 Talk: JUnit 5 and Sling/AEM Mocks
  adaptTo() 2016 Talk: Unit Testing with Sling & AEM Mocks
  adaptTo() 2014 Lightning Talk: Mock AEM & Co for Unit Tests
- Apache Sling Mocks
  http://sling.apache.org/documentation/development/sling-mock.html
  http://sling.apache.org/documentation/development/osgi-mock.html
  http://sling.apache.org/documentation/development/jcr-mock.html
- Core Components
  https://github.com/adobe/aem-core-wcm-components/tree/master/testing/aem-mock-plugin

References 2/2

- Need Help? Use the Mailing Lists
  http://wcm.io/mailing-lists.html
- File a bug or extension requests (PRs welcome!)
  https://wcm-io.atlassian.net/browse/WTES
- Trouble Shooting Articles
  List of AEM Mock Context Plugins
  How to use AEM Mocks in Adobe AEM Project Archetype
  Migrate AEM Mocks Unit Tests from JUnit 4 to JUnit 5
  AEM Mocks fails with "No OSGi SCR metadata found for class ..."
- Examples for Unit Tests using AEM Mocks:
  Look at the repositories in https://github.com/wcm-io -
  most of them contains lots of test code using AEM Mocks

Questions?