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EUROPE'S LEADING AEM DEVELOPER CONFERENCE

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Promoting Solid Code Architecture in AEM

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Introduction

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- Web development, Java, AEM, software craftsmanship, testing, reusability, architecture, coaching
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Agenda

1) Learning AEM
2) Architecture Patterns
3) The Glue for Our Code
4) Architecture Rules
5) Best Practices
6) Coding Guidelines
7) Custom Quality Rules
8) Conclusion
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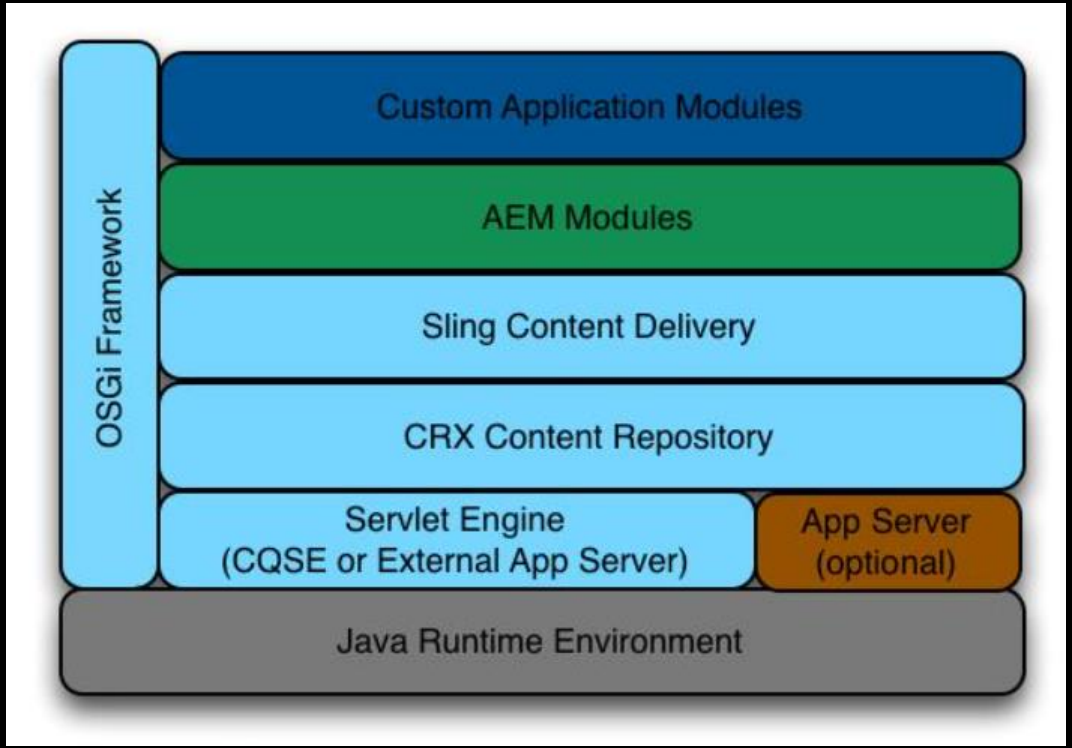
Learning AEM

Learning AEM

- Adobe Experience Manager is not the simplest Web development framework to master
  - Sling works quite differently compared to most popular choices like Spring or Java EE
  - You cannot simply apply MVC pattern
  - You won’t find a controller Java class

Code Architecture

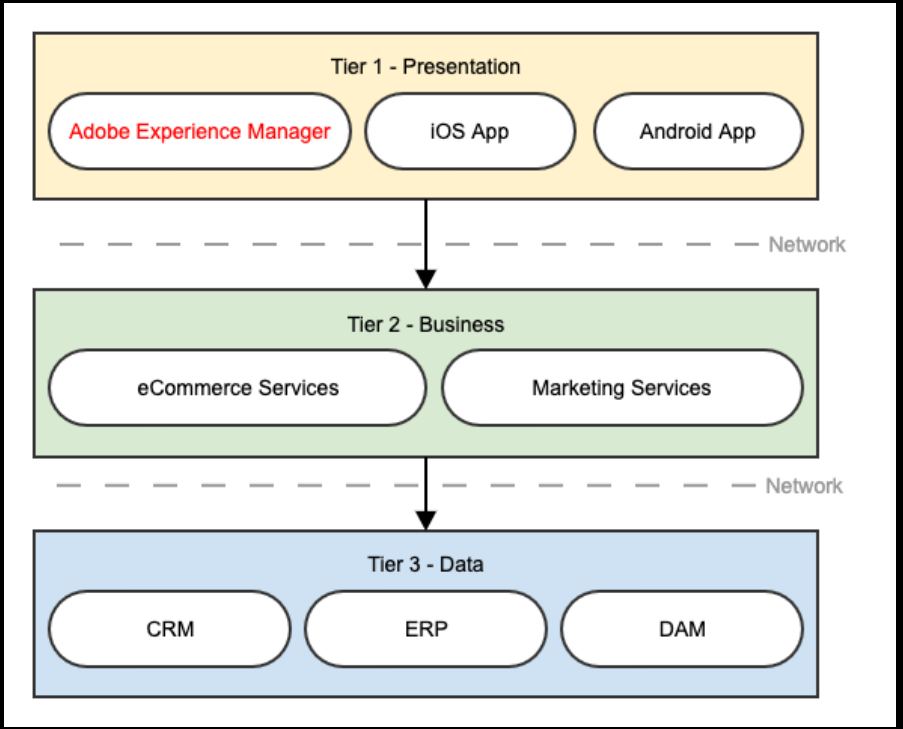
- Adobe teaches us AEM runtime architecture
- But what does that mean for our code?



Architecture Patterns

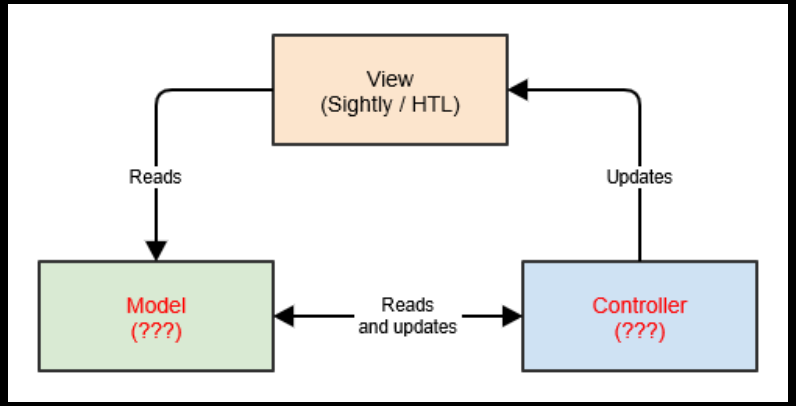
The N-Tier Pattern

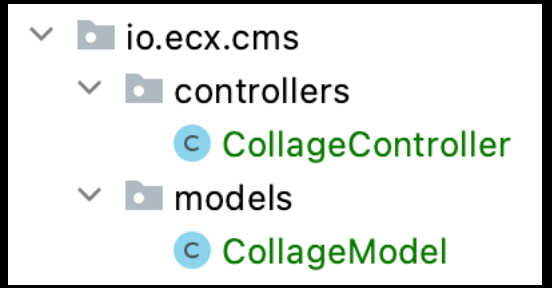
- In an enterprise architecture, AEM is usually in the top layer / tier (presentation)



The MVC Pattern

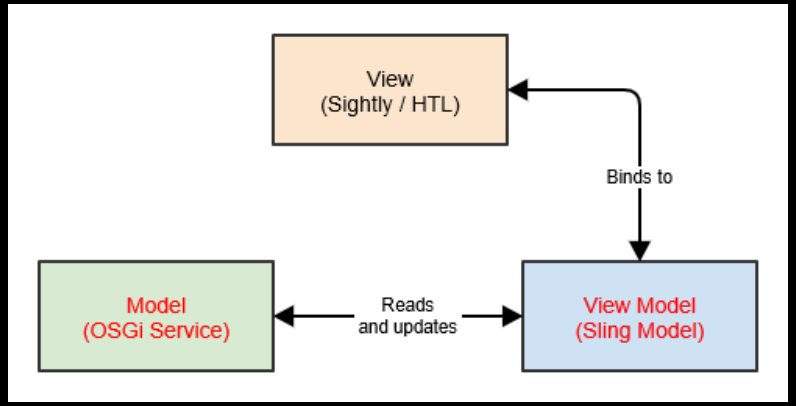
- MVC cannot be applied to AEM components
- Sling Models are not Controllers, because Apache Sling handles script resolution





The MVVM Pattern

- The View (HTL) binds to the methods provided by the View-Model (Sling Model)



- The View-Model (Sling Model) calls the business logic implemented in dedicated components (OSGi Services)

The Glue for Our Code

Sling Models

- Sling Models are the glue between our UI, database and business logic
- Heavily misused on a lot of AEM projects
  - Can easily become very large if separation of concerns is not applied properly
  - Injecting data, providing view methods, implementing logic, injecting other models

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Example – Sling Models

- Connect data with business logic
- Keep it simple
- Move business logic to dedicated OSGi services

```java
@Slf4j
@Model(adaptables = SlingHttpServletRequest.class,
  defaultInjectionStrategy = DefaultInjectionStrategy.OPTIONAL)
public class ArticlesListModel {

    @SlingObject
    private ResourceResolver resourceResolver;

    @ScriptVariable
    private Page currentPage;

    @OSGiService
    private TextExcerptsService textExcerptsService;

    @OSGiService
    private ImageFinderService imageFinderService;

    @OSGiService
    private LinkService linkService;

    @Getter
    @ValueMapValue
    private List<ArticleItem> articles;
```

Example – OSGi Services

- Highly reusable
- Easily testable
  - TDD
  - BDD

```java
@Component(service = TextExcerptsService.class, immediate = true)
public class TextExcerptsServiceImpl implements TextExcerptsService {

    @Override
    public String getTextExcerpts(final Page articlePage, final int maxLength) {
        final List<Resource> mainContentResources = ResourceUtils.getMainContentResources(articlePage);
        return mainContentResources
                .stream() Stream<Resource>
                .filter(resource -> resource.getResourceType().equals(TEXT_COMPONENT_RESOURCE_TYPE))
                .findFirst() Optional<Resource>
                .map(resource -> resource.adaptTo(TextModel.class)) Optional<TextModel>
                .map(TextModel::getText) Optional<String>
                .map(text -> StringUtils.abbreviate(htmlTagsPattern
                                                    .matcher(text)
                                                    .replaceAll(StringUtils.EMPTY), maxLength))
                .orElse(StringUtils.EMPTY);
    }
```

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Architecture Rules

ArchUnit

- Library for checking the architecture of your Java code using Junit
  - https://www.archunit.org/
- ArchUnit can check dependencies between packages and classes, layers and slices, check for cyclic dependencies and more
  - https://github.com/dstr89/aem-archunit

Example – OSGi Services

- Only interfaces allowed
- Force a naming convention
- Classes are annotated

```
classes()
  .that().resideInAPackage(SERVICES_PACKAGE)
  .should().beInterfaces();

classes()
  .that().resideInAPackage(SERVICES_PACKAGE)
  .should().haveSimpleNameEndingWith( s: "Service");

classes()
  .that().resideInAPackage(SERVICES_IMPL_PACKAGE)
  .should().beAnnotatedWith(Component.class);
```

Example – Sling Models

- Dependencies between packages
- No static methods allowed

```
noClasses()
  .that()
  .resideInAnyPackage(COMPONENTS_PACKAGE, MODELS_PACKAGE)
  .should()
  .dependOnClassesThat()
  .resideInAPackage(SERVLETS_PACKAGE);

methods()
  .that().areDeclaredInClassesThat()
  .resideInAnyPackage(COMPONENTS_PACKAGE, MODELS_PACKAGE)
  .should().notBeStatic()
  .orShould()
  .haveModifier(JavaModifier.SYNTHETIC);
```

Best Practices

Value of Documentation

- Agile value misconception
  - „Working software over comprehensive documentation”
- Make notes on the good practices that you see on different projects
  - We always refer to previous projects and lessons learned

Example – OSGi Services

- Place business logic in Services, not Utils
  - Single Responsibility and Open-Closed Principle
- Prefer Sling APIs over JCR
- Close service resource resolver

```
try (ResourceResolver resourceResolver = getServiceResourceResolver()) {
    // Use resource resolver here
} catch (RuntimeException e) {
    log.error("Error creating base names", ex);
}
```

Example – Sling Models

- Use injector-specific annotations
  - Instead of using *@Inject* everywhere
- Log runtime exceptions in *@PostConstruct*

```
try {
    this.query = Optional.ofNullable(this.request.getParameter(PARAMETER_QUERY)).orElse(StringUtils.EMPTY);
    this.articles = this.searchArticles();
} catch (final RuntimeException e) {
    log.error("Error while initiating model", e);
}
```

Example – Avoid *adaptTo*

- Doesn't throw exceptions, harder to mock

```
ValueMap valueMap = this.resource.getValueMap(); // Recommended
ValueMap valueMap = this.resource.adaptTo(ValueMap.class);  // Not recommended

@Reference
private PageManagerFactory pageManagerFactory;

PageManager pageManager = pageManagerFactory.getPageManager(resourceResolver); // Recommended
PageManager pageManager = resourceResolver.adaptTo(PageManager.class);  // Not recommended

@Reference
private QueryBuilder queryBuilder;

this.queryBuilder.createQuery(predicates, session); // Recommended
QueryBuilder queryBuilder = resourceResolver.adaptTo(QueryBuilder.class);  // Not recommended
```

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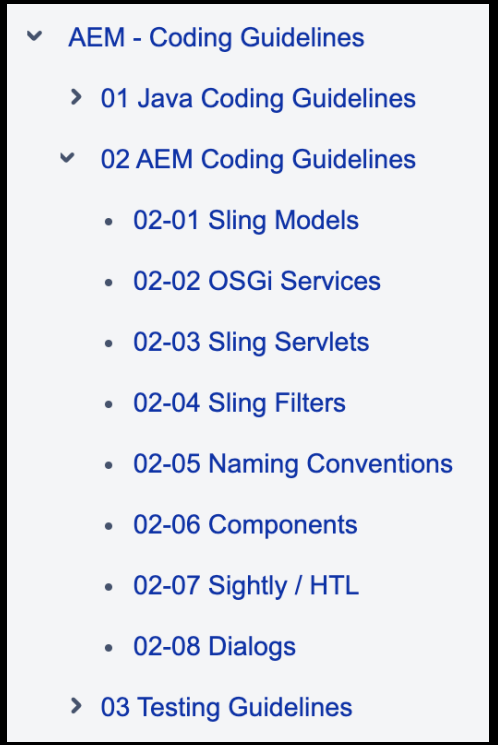
Coding Guidelines

Promoting Best Practices

- With time, a set of notes can become company coding guidelines
  - Share them with everyone in the company
  - Anyone can and should contribute
  - Use them to align with other developers
  - Use them to coach junior developer

Benefits of Guidelines

- Boost quality and align codebases on all your AEM projects
- Learn on mistakes others made
- Easy to switch people on projects
- Brings competitive advantage through quality KPIs and expanding existing client engagements



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Custom Quality Rules

Static Code Analysis

- Coding guidelines can be automated using a set of custom SonarQube rules
- Automated checks, together with pull-request decoration feature, helps us ensure that guidelines really do get applied on all projects
  - If it not automated, it probably won’t be used

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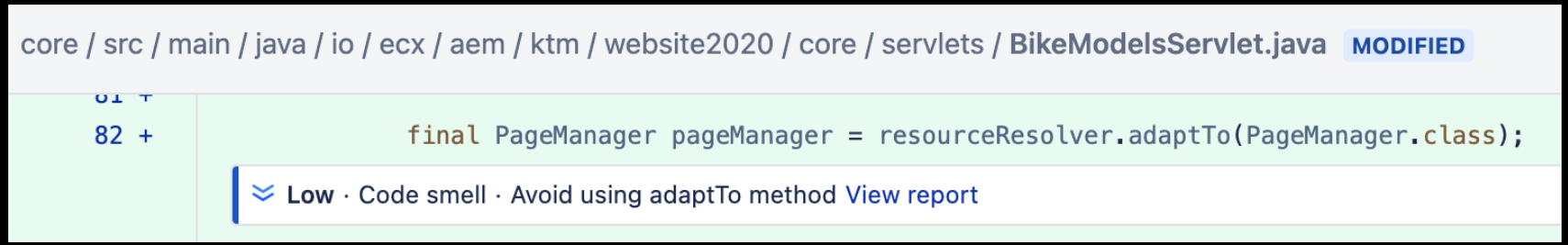
Example – Rule Definition

```
@Override
public void visitMethod(@Nonnull final MethodTree methodTree) {
    if (JavaFinder.containsAnnotation(methodTree, PackageConstants.POST_CONSTRUCT_ANNOTATION)) {
        final BlockTree blockTree = methodTree.block();
        if (blockTree != null) {
            final List<StatementTree> blockElements = blockTree.body();
            if (isTryStatementFirst(blockElements)) {
                this.context.reportIssue( javaCheck: this, methodTree.simpleName(),
                        s: "Wrap all the code in a try-catch clause");
            } else {
                final TryStatementTree tryStatementTree = (TryStatementTree) blockElements.get(0);
                this.checkCaughtExceptions(tryStatementTree);
            }
        }
    }
    super.visitMethod(methodTree);
}
```

Example – Rule Usage

- SonarLint

- BitBucket



Conclusion

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Summary

- AEM doesn’t follow the MVC pattern, instead it more aligned with the MVVM
- Define a clear separation of concerns
  - Just because we can write all the code in the Sling Model, doesn’t mean we should
  - Use OSGi Services as much as possible, as they promote reusability and testability

Conclusion

- Coding guidelines help boost quality and alignment between project teams
  - Architectural and SonarQube rules ensure that guidelines actually do get applied on projects
- Creating internal guidelines and assets requires a significant team effort, but it pays off in the long term

Thank you! Questions?