**34. AOP Aspect-Oriented Programming Overview**.



Programming technique based on concept of an Aspect. Aspect encapsulates cross-cutting logic (cross-cutting concerns). Concerns means logic/functionality. Aspect can be used at multiple locations. Same aspect/class applied based on configuration.

Benefits of AOP:

* Code for Aspect is defined in a single class.
* Business code in your application is cleaner
* Configurable (no need to change code)

Additional AOP Use cases:

* Most common: logging, security, transaction
* Audit logging: who, what, when, where
* Exception handling: log exception and notify DevOps team via SMS/email
* API Management: how many times has a method been called user. Analytics: what are peak times? What is average loading? Who is the top user?

Disadvantages:

* Too many aspects and app flow is hard to follow
* Minor performance cost for aspect execution (run-time weaving)

**Aspect:** module of code for a cross-cutting concern

**Advice:** What action is taken and when it should applied

**Join Point:** When to apply code during program execution

**Pointcut:** A predicate expression for where advice should be applied

**Advice Types:**

* Before advice
* After finally advice
* After returning advice
* After throwing advice
* Around advice

**Weaving.** Connecting aspects to target objects to create an advised object. There are different types of weaving: Compile-time, load-time or runtime.

There are two leading AOP Frameworks: Spring AOP, AspectJ

Spring AOP:

* Security, transaction, caching
* Uses run-time weaving aspects

Spring AOP Advantages:

* Simpler to use than AspectJ
* Uses proxy pattern
* Can migrate to AspectJ when using @AspectJ annotation

Disadvantages:

* Only supports method-level join points
* Can only apply aspects to beans created by Spring app context
* Minor performance cost for aspect execution (run-time weaving)

AspectJ Advantages:

* Support all join points
* Works with any POJO not just beans from app context
* Faster performance compared to Spring AOP
* Complete AOP support

Disadvantages:

* Compile-time weaving requires extra compilation step
* AspectJ pointcut syntax can become complex

Spring AOP is a light implementation of AOP. Solves common problems in enterprise applications.

Link: AspecJ in Action. Aspect Oriented Programming with use Cases