Go for the Money! JSR-354

A quick introduction to the Java Money and Currency API

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July 6, 2017

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Session Material

Slides, Code, Video

http://fihlon.ch/jfs17
About Me

- **Software Engineer**
  CSS Insurance, Open Source Software

- **Agile Coach**
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What to expect

- **History**
  A brief retrospect in time.

- **Motivation**
  Why do we need a new API?

- **Requirements**
  Requirements for the new API.

- **Boring slides**
  Some theoretic stuff about the JSR-354.

- **Source code**
  Because we are hackers!
- `float`, `double` *(since Java 1)*
- `java.math.BigDecimal` *(since Java 1.1)*
- `java.text.DecimalFormat` *(since Java 1.1)*
- `java.util.Currency` *(since Java 1.4)*
Motivation

- Monetary values are a key feature for many applications
- `java.util.Currency` is a structure for ISO-4217 only
- No support for historic or virtual currencies
- No support for currency arithmetic or conversion
- No standard value type to represent a monetary amount
- `java.text.DecimalFormat` lacks flexibility
Requirements

- Easy **addition** and **modification** of currencies
- Currencies need a **context** and should be **client-aware**
- Standard API for **money amounts**, **rounding**, **conversions**
- Easy, flexible, complex, individual **formatting** and **parsing**
- Clearly defined **extension points**
- Follow the **design principles** of the Java platform
- Compatibility with **Standard Edition** and **Micro Edition**
- No external **dependencies**
- **Interoperability** with existing artefacts
- Support **functional** programming style
Three years of hard work

- JSR-354 started early 2012
- JSR-354 early draft review in 2013
- Reference implementation started late 2013
- Final release of JSR-354 early 2015
- Final release of reference implementation early 2015
Highway of slides...
Currencies

- **Monetary**
  - Get a currency by code or locale
  - Additional API for complex queries
  - Supports SPI to enhance functionality

- **CurrencyUnit**
  - Currency code (string and number)
  - Additional context information (e.g. type, capabilities)

- **CurrencyQueryBuilder**
  - Builder for complex queries for accessing currency units
Monetary Amounts

- **Monetary**
  - Get a monetary amount by currency and value
  - Optionally specify an explicit factory
  - Or query for a suitable factory
  - Supports SPI to enhance functionality

- **MonetaryAmount**
  - Numeric value and currency
  - Arithmetic operations to do calculations
  - Multiple implementations
  - Interoperability rules
  - Additional context information (e.g. capabilities)

- **MonetaryAmountFactoryQueryBuilder**
  - Builder for complex queries for accessing monetary amount factories
Rounding

- **Monetary**
  - Get a rounding operator
  - Optionally specify a locale
  - Or query for a suitable rounding operator
  - Supports SPI to enhance functionality

- **MonetaryRounding**
  - Extends `MonetaryOperator`
  - Multiple implementations
  - Additional context information

- **RoundingQueryBuilder**
  - Builder for complex queries for accessing rounding operators
Conversion with currency conversion

- **MonetaryConversions**
  - Get a currency conversion by currency code or unit
  - Or query for a suitable currency conversion
  - Supports SPI to enhance functionality

- **CurrencyConversion**
  - Multiple implementations
  - Source and target currency
  - Conversion factor
  - Additional context information
  - Unidirectional

- **ConversionQueryBuilder**
  - Builder for complex queries for accessing currency conversions
Conversion with exchange rate provider

- **MonetaryConversions**
  - Get an exchange rate provider
  - Or query for a suitable currency conversion
  - Supports SPI to enhance functionality

- **ExchangeRateProvider** → **ExchangeRate**
  - Multiple implementations
  - Source and target currency
  - Conversion factor
  - Additional context information
  - Unidirectional

- **ConversionQueryBuilder**
  - Builder for complex queries for accessing exchange rate providers
Formatting and parsing

- **MonetaryFormats**
  - Get a monetary amount format
  - Optionally specify a locale
  - Or query for a suitable monetary amount format
  - Supports SPI to enhance functionality

- **MonetaryAmountFormat**
  - Multiple implementations
  - Additional context information
  - Format monetary amounts
  - Parse monetary amounts

- **AmountFormatQueryBuilder**
  - Builder for complex queries for accessing monetary amount formats
Live Coding
Wrap-up
Interfaces

- CurrencyConversion
- CurrencySupplier
- CurrencyUnit
- ExchangeRate
- ExchangeRateProvider
- ExchangeRateProviderSupplier
- MonetaryAmount
- MonetaryAmountFormat
- MonetaryOperator
- MonetaryQuery
- MonetaryRounding
- NumberSupplier
Service Provider Interfaces

- CurrencyProviderSpi
- MonetaryAmountFactoryProviderSpi
- MonetaryAmountFormatProviderSpi
- MonetaryAmountsSingletonQuerySpi
- MonetaryAmountsSingletonSpi
- MonetaryConversionsSingletonSpi
- MonetaryCurrenciesSingletonSpi
- MonetaryFormatsSingletonSpi
- MonetaryRoundingsSingletonSpi
- RoundingProviderSpi
Validation

Money Validation by Zalando

- Validate monetary amounts
- Uses existing, standardized constraints
- Offers additional, more expressive custom constraints
- Can be use with any Bean Validation implementation

```java
@Min
@Max
@DecimalMin
@DecimalMax
@Positive
@PositiveOrZero
@Negative
@NegativeOrZero
@Zero
```
Compatibility

- Supports
  - Java Micro Edition
  - Java Standard Edition
  - Java Enterprise Edition

- Compatible with Java 8+

- Backport available for Java 7
Maven

pom.xml

```xml
<dependency>
  <groupId>javax.money</groupId>
  <artifactId>money-api</artifactId>
  <version>1.0.1</version>
</dependency>

<dependency>
  <groupId>org.javamoney</groupId>
  <artifactId>moneta</artifactId>
  <version>1.1</version>
</dependency>
```
build.gradle

```groovy
1 compile(
2     'javax.money:money-api:1.0.1',
3     'org.javamoney:moneta:1.1'
4 )
```
Links

- Java Money Umbrella Site
  http://javamoney.org/
- JSR-354 Specification
  http://javamoney.github.io/api.html
- JSR-354 Reference Implementation
  http://javamoney.github.io/ri.html
- JSR-354 Technical Compatibility Kit
  http://javamoney.github.io/tck.html
- Java Money Financial Library
  http://javamoney.github.io/lib.html
- Money Validation
  https://github.com/zalando/money-validation
Thank You! Questions?

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