

SOLUTION

[I] Implemented task using Test Driven Development and Object Oriented design. Also added maven build for the project.

[II] Updated/added classes and restructured packages as follows:

1. Package: `com.lloydsbanking.interview.model`

(Folder: `/widgets/src/main/java/com/lloydsbanking/interview/model/`)

This contains following model classes:

EngineType.java:

- This is a new enum added to support multiple engines.
- This contains various engine types (internal combustion and steam).

FuelType.java:

- This enum has been updated. The new fuel types added are wood and coal needed for steam engine.

2. Package: **`com.lloydsbanking.interview`**

(Folder: `widgets/src/main/java/com/lloydsbanking/interview/`)

This contains following class:

WidgetMachine.java:

- This has been updated to make it more cohesive and loosely coupled.
- Has dependencies on abstract class `Engine` and interface `BatchDetailsStore`.
- Methods `produceWidgets` and `produce` now return values in `BigDecimal` which is more suitable for money representation.

3. Package: **`com.lloydsbanking.interview.engine`**

(Folder: `/widgets/src/main/java/com/lloydsbanking/interview/engine/`)

This contains following engine related classes:

Engine.java:

- This is a new abstract class.
- This contains all the engine related operations.
- This also has `EngineType` property.
- Constructor has parameters engine type and fuel type.

EngineFactory.java:

- This is a new class.
- This has a method `getEngine` which returns engine for a given engine type and fuel type. In case engine type is not supported or there is invalid fuel type then `IllegalArgumentException` is thrown.

InternalCombustionEngine.java:

- This now extends an abstract class (`Engine`).
- Constructor has fuel type parameter and it is private because instance is returned through `getInstance` method.
- Method `getInstance` returns internal combustion engine for a given fuel type. It throws `IllegalArgumentException` in case fuel type is not supported.

SteamEngine.java:

- This is a new class to support steam engine. It extends Engine abstract class.
- Constructor has fuel type parameter and it is private because instance is returned through getInstance method.
- Method getInstance returns internal steam engine implementation for a given fuel type. It throws IllegalArgumentException in case fuel type is not supported.

4. Package: com.lloydsbanking.interview.store

(Folder: /widgets/src/main/java/com/lloydsbanking/interview/store/)

This contains following interface and class (to provide data to WidgetMachine):

BatchDetailsStore.java:

- This has various batch details functions (for batch cost and batch size).

BatchDetailsStoreProperties.java

- This is implementation of BatchDetailsStore interface.
- This fetches batch costs and sizes from respective properties file.
- Data is in form of following properties files (at /widgets/src/main/resources package com.lloydsbanking.interview.store):
 - **costs.properties**: Contains fuel types and corresponding costs.
 - **sizes.properties**: Contains engine types and corresponding batch sizes.

[III] JUnit Tests for Test Driven Development:

WidgetMachineTest.java

(Package com.lloydsbanking.interview,

Folder: /widgets/src/test/java/com/lloydsbanking/interview/)

- This contains widget machine related tests.
- Tests also cover various Engine implementations.

EngineTest.java

(Package com.lloydsbanking.interview.engine,

Folder: /widgets/src/test/java/com/lloydsbanking/interview/engine/)

- This contains engine related tests.

Tests cover 100% of the core classes (WidgetMachine, Engine, InternalCombustionEngine, SteamEngine) and 93% of the total code as shown below:

Element	Coverage	Covered Instructions	Missed Instructions	Total Instructions
widgets	86.5 %	468	73	541
src/test/java	75.5 %	151	49	200
src/main/java	93.0 %	317	24	341
com.lloydsbanking.interview.model	81.2 %	78	18	96
EngineType.java	76.3 %	29	9	38
FuelType.java	84.5 %	49	9	58
com.lloydsbanking.interview.engine	97.6 %	120	3	123
EngineFactory.java	84.2 %	16	3	19
Engine.java	100.0 %	64	0	64
InternalCombustionEngine.java	100.0 %	20	0	20
SteamEngine.java	100.0 %	20	0	20
com.lloydsbanking.interview.store	94.1 %	48	3	51
BatchDetailsStoreProperties.java	94.1 %	48	3	51
com.lloydsbanking.interview	100.0 %	71	0	71
WidgetMachine.java	100.0 %	71	0	71