Programming Paradigms

Procedural

Object Oriented

Functional Programming

Logic Programming

Key Value DB - Object Oriented

First attempt - v1 code walkthrough

Support new commands

INCR or INCRBY

Support new behaviour

- printing the issued command
- lazy / remote evaluation
- etc…

Constraints

- No modifications to the existing code
- Strong Static Type Safety
- Separate Compilation
- Extensibility in both directions - types and behaviour

Why?

Key Value DB - Object Oriented

v2 code walkthrough

Object Oriented - Pros/Cons

- easy to add new types/commands
- not so much for new behaviours

Can we do better with Functional Programming?

Key Value DB - Functional

First attempt - v1 code walkthrough

Support new behaviour

- printing the issued command
- lazy / remote evaluation
- etc…

Support new commands

INCR or INCRBY

Same Constraints as before

- No modifications to the existing code
- Strong Static Type Safety
- Separate Compilation
- Extensibility in both directions - types and behaviour

Key Value DB - Functional

Second attempt - v2 code walkthrough

Functional Programming - Pros/Cons

- easy to add new behaviours
- not so much for new types/commands

Object Oriented

behaviours / types	execute	stringify	new behaviour
set	✅	✅	❌
get	✅	✅	❌
new type	✅	✅	

Functional Programming

behaviours / types	execute	stringify	new behaviour
set	✅	✅	✅
get	✅	✅	✅
new type	❌	❌	

Conclusion?

Types or Behaviour - Pick one ☹️

Expression Problem

Can we pick the best of both OO and FP?

Possible (non) Solutions

- Visitor
- Partial/Extensible classes (monkey patching)
- Extension methods
- Cast based type switches

https://channel9.msdn.com/Shows/Going+Deep/C9-Lectures-Dr-Ralf-Laemmel-Advanced-Functional-Programming-The-Expression-Problem

Possible Solutions

- Type classes (Haskell, Scala)
- Dynamic Dispatch (Clojure)

Key Value DB - best of OO + FP

code walkthrough (one possible implementation**)

References

- Expression problem and non-solutions - https://channel9.msdn.com/shows/Going+Deep/C9-Lectures-Dr-Ralf-Laemmel-Advanced-Functional-Programming-The-Expression-Problem/
- Typeclasses solution - https://channel9.msdn.com/Shows/Going+Deep/C9-Lectures-Dr-Ralf-Lmmel-Advanced-Functional-Programming-Type-Classes
- Clojure solution - https://gist.github.com/elnygren/e34368a86d62f0cb75f04ba903f7834a
- Scala solution - https://gist.github.com/izmailoff/41c7f790eb97042c30788538875 4a0be